Journal of Health Science & Education
An open access journal
ISSN 2817-1780
eSciRes
ISSN 2817-1780
Research Article
JHSE-1-243

HIV Knowledge, Risk Behaviors, and Testing Among Chinese-, Korean-, and Vietnamese-American Women

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Abstract

The relationship between HIV knowledge and testing behavior is poorly understood among young Chinese-, Korean-, and Vietnamese-American women. This study assesses: (1) levels of HIV/AIDS knowledge, (2) lifetime and annual prevalence of HIV testing, and (3) whether higher levels of HIV knowledge were associated with increased likelihood of testing after controlling for HIV risk behaviors. Fifty-one percent reported lifetime HIV testing (n=117); among those tested, 53% were tested within the past year. A significant and positive association between scores on the HIV Knowledge Questionnaire (HIV KQ-45) and HIV testing was identified. This association was no longer statistically significant after controlling for sexual risk behaviors. Participants were most knowledgeable about HIV symptoms (88.6%) and least knowledgeable about treatment options (56.8%). Future studies should further characterize cultural factors affecting these women's sexual practices, as well develop culturally adapted HIV educational interventions to increase HIV knowledge and testing rates.

Keywords: HIV testing, HIV/AIDS, Asian American women, AWARE intervention, HIV knowledge, Risk behaviors.

Background

Asian-Americans (AAs) are the only racial/ethnic group to experience statistically significant increases (4.4%) in new diagnoses of the Human Immunodeficiency Virus (HIV) in recent years [1]. Centers for Disease Control and Prevention (CDC) data indicate that between 2005 and 2014, the number of AAs receiving an HIV diagnosis increased by nearly 70% [2]. Although overall prevalence of HIV among AAs is low, there has been a continuous growth in diagnostic rates between 2011 and 2017, from 5.7 to 6.0 per 100,000 people. This is striking when compared to the decrease seen in other racial/ethnic groups; among Black Americans, for example, rates decreased from 60.3 to 49.8 per 100,000 cases in this same time period [2].

To date, the majority of studies on HIV/AIDS among AAs have focused on men who have sex with men (MSM), understandably, as the majority of HIV-positive individuals among AAs fall into this group. Though important, these studies overlook compelling reasons to study HIV/AIDS in sexually active AA women [3]. Research indicates that, although AA women tend to be sexually conservative, once sexually active, they exhibit risky sexual behaviors, such as unprotected sex and anal intercourse, at similar levels as other racial/ethnic groups. However, they continue to perceive themselves to be at low risk for HIV. AA women often have the added burden of cultural taboos regarding sex, as well as a significant community stigma towards HIV and other sexually transmitted infections (STIs) [4].

In particular, women who engage in heterosexual intercourse should be targeted for research; heterosexual transmission comprises 93% of incident HIV cases in this population [2]. This population also has low levels of consistent condom use. In a 2012 study by Hahm et al., reported only 37% of AA young women used condoms regularly [5]. One study found, for example, that in comparison to their white counterparts, Chinese- and Japanese-Americans often felt that female partners who suggested condom use during sex were less attractive [6]. The cultural and gendered stigma around AA women's sexual behavior may prevent them from openly discussing safer sex practices and HIV testing with their partners, leaving them at risk for unprotected sex and increasing their risk for contracting and transmitting HIV [6]. These point to a need to address the preventative health gap for AA women using culturally relevant methods.

One of the most effective ways to prevent HIV transmission is HIV testing [7]. Research has consistently

shown the importance of being tested early and frequently once becoming sexually active [7]. Early diagnosis can also help those with HIV engage in practices to protect their own safety and the safety of others (e.g., treatment with antiretroviral medications, disclosure to partners, and safer decisions around needle sharing). Those who know their serostatus can get medical care to extend their lives, including medications that can reduce HIV spread by as much as 96%; however, to do this, they must first know whether they are infected or not [8].

Research consistently shows that AAs have lower levels of HIV/AIDS knowledge. One study found that within a sample of 248 AA college students, the average student was only able to answer 2 out of 7 questions about HIV correctly, incorrectly answering basic questions about transmission, risk, and prevention [9]. Another study conducted on Southeast Asians found low levels of HIV knowledge in this population; 16.9% of respondents were unable to answer a single question correctly on a seven-point HIV knowledge scale. 56% of respondents answered only one to three questions correctly. This study also demonstrated that higher level of HIV knowledge was associated with higher levels of HIV testing [9].

Some methodological limitations should be noted in these studies. Because the majority have used brief questionnaires (7-13 items), it is difficult to get a nuanced grasp on which specific domains are known, as well as the overall extent of HIV knowledge in this group [4,9,10]. Many also combine sexually active and inactive samples, making it difficult to provide population-specific information for prevention [4,11]. Moreover, very few studies specifically targeted AA women for HIV testing behaviors or testing intention; thus, gender-specific experiences and knowledge are not well understood [4,10].

HIV testing proportions among Asian-Americans vary greatly by subgroup. Asian-American MSM have high lifetime rates of HIV testing, ranging from 70.4% to 82%. In contrast, lifetime rates for female community samples are much lower, ranging from 14% to 33.2% [4,12-14].

Among a national sample of sexually active women between 18 and 27 years, AA women reported the lowest prevalence of HIV testing (17.2%) among all racial groups, including White (22.1%), Black (26.2%), and Latinx/Hispanic (20.3%) women. This low prevalence may be linked to their perception of decreased risk of contracting HIV/AIDS [15]. A study by Hahm et al. found that perceived low gender power was associated with HIV risk behaviors, namely having risky sexual partners and having more than one sexual partner [5]. Recent studies on sexual risk in AA women have indicated that they are also significantly more likely to have sex without a condom when compared to other-race peers [16]. Thus, it is critical to control for their sexual risk behaviors in any statistical model looking at HIV knowledge and testing for AA women.

To address these limitations, the current study targets young Asian-American women who reported sexual intercourse within the last three months. We employ the full 45-item HIV Knowledge Questionnaire (HIV-KQ-45), which examines multiple HIV/AIDS knowledge domains, including treatment, transmission, prevention, and symptoms. To our knowledge, this is the first study to assess whether there is an association between HIV knowledge and testing, while controlling for HIV risk behaviors, among sexually experienced Chinese-, Korean-, and Vietnamese-American young women. These women volunteered to participate in a psychotherapy intervention called the Asian Women's Action for Resilience and Empowerment (AWARE) [17-19].

Ethical Consideration

In order to protect the confidentiality of participants, the participant had his or her name and ID number linked in a password-protected computer document to which only PI (H.C. Hahm) and a limited group of personnel have access. In order to assure confidentiality, individual scores on assessments did not release to anyone, including participants. Participants received $20 for completion of eligibility screening. This study was approved by Boston University, Institutes of Review Board (IRB).

Aim

Using cross-sectional data, this study aims to examine: (1) the lifetime prevalence of HIV testing, (2) the levels of HIV/AIDS knowledge, and (3) the association between levels of HIV/AIDS knowledge and likelihood of HIV testing before and after controlling for HIV risk behaviors.

Subjects

Between February 2014 and June 2015, 435 Chinese-, Korean-, and Vietnamese-American women in the Greater Boston area were recruited and screened for eligibility to participate in a larger study examining the AWARE intervention. AWARE is an 8-week group psychotherapy program intended to improve mental and sexual health for 1.5- and 2nd-generation AA women. 1.5 generation refers to individuals who immigrate to a new country before their early teens and 2nd generation refers to the US born children of foreign-born parents [20].

Recruitment

Participants were recruited through flyers, electronic advertisements, e-mails, and posters at local universities. Other recruitment methods included word of mouth and outreach at local community events.

Participants were required to be 18-35 years of age; unmarried; Chinese-, Korean-, Vietnamese-American, or any combination thereof; 1.5- or 2nd-generation Americans; fluent in English; had a cell phone with texting capabilities; and were sexually active. Of those screened, 173 women who met the criteria completed clinical assessments, which asked about their HIV testing history, sexual practices, HIV-related risk behaviors, and HIV knowledge. Responses were collected using computer-assisted survey interviews, as research has shown these topics may be difficult to disclose in person [21]. Of those who completed the assessment, 128 women (74%) reported current sexual activity (defined as any sexual

intercourse within the past three months). Among these, women who knew their HIV testing status (n=117) were included in the study's final analytic sample. Women who were excluded because they did not know their testing status (n=11) did not substantially differ from those included with respect to demographics and HIV knowledge. The research was approved by the university Institutional Review Board (IRB).

Sexual health assessment measures

HIV risk behaviors: HIV risk behaviors were assessed using the AIDS Risk Behavior Assessment (ARBA) according to Donenberg [22]. Participants were queried about lifetime injection drug use and sexual behaviors, including frequency of condom use and number of sexual partners in the past three months. There is no universal definition for "high risk populations" with regards to HIV transmission among current literature. Some interventions target MSM; some drug users; and some specific racial/ethnic groups, especially Black and Latinx populations [23-27]. Consistent with other studies on HIV risk in women , participants in this study were categorized as high-risk if any of the following were true: (a) there was injection drug use across their lifetime; (b) they had more than one sexual partner over the last three months; (c) they never used condoms during vaginal intercourse; or (d) they participated in anal sex with inconsistent condom use [28,29]. These criteria are based on well-established findings that show women are most often exposed to HIV through heterosexual contact while practicing high risk sexual and drug behaviors, as well as exposure to partners engaging in these same behaviors [30].

HIV knowledge: HIV knowledge was assessed using the 45-item HIV Knowledge Questionnaire (HIV-KQ-45). Items were grouped into the following six categories: HIV versus AIDS, Treatment, Transmission (general), Transmission (sexual activity and pregnancy), Prevention, and Symptoms. Subject-specific scores were assigned based on the number of respondents answering correctly divided by the total number of respondents, with possible scores ranging from 0 to 100%. Missing items were not used to calculate final scores. The HIV-KQ-45 has high internal consistency (Cronbach's α: .91) and high test-retest reliability (at 12 weeks, r=.90) [31].

HIV testing behaviors: HIV testing history was assessed with a single survey question; participants indicated whether they had ever received HIV testing over the course of their lifetime. Participants had the option to indicate "do not know" with regards to their testing history. For women who reported prior testing, the date of the most recent test was recorded.

Data analysis

All quantitative analyses for this cross-sectional study were performed using SAS/STAT, version 9.3. The primary outcome variable for the study was any lifetime HIV testing; time since last HIV test (in years) was also assessed descriptively. The primary predictors for the study were HIV knowledge and high-risk behaviors. First, means and standard deviations were calculated for continuous data, and frequencies and percentages were calculated for categorical data. Data were then reviewed for plausibility, distribution, and missing values. Women who were reportedly unsure of testing history were excluded from the analysis. Next, to evaluate the association between HIV knowledge scores and participants' HIV testing history, we used two-sided t-tests and logistic regression models. We evaluated associations with both HIV knowledge overall and for knowledge within specific categories. We also evaluated the association between high-risk behaviors and HIV testing using crude logistic regression models. High-risk behaviors that were bivariate and associated with HIV testing were included in a final multivariable model with overall HIV knowledge. Odds ratios (ORs) and 95% confidence intervals were estimated. With respect to their interpretation for HIV knowledge, each OR corresponded to a 1-unit increase in correct responses for each knowledge category and a 5-unit increase for knowledge overall. All statistical significance testing was performed with a significance level of $\alpha = 0.05$.

Results

Parameter	Category Measure	Statistic Used	Statistic
Age (years)	Years	Mean±sd	23.73 ± 3.71 (M ± SD)
		Median	22.74
		Min: Max	18.20: 34.68
Education	High school degree or less	n (%)	7 (5.98)
	Undergraduate	n (%)	93 (79.49)
	Graduate/Professional	n (%)	17 (14.53)
Ethnicity	Chinese	n (%)	66 (56.41)
	Korean	n (%)	20 (17.09)
	Vietnamese	n (%)	14 (11.97)
	Mixed*	n (%)	17 (14.53)
Sexual Orientation	Exclusively heterosexual	n (%)	79 (67.52)
	Mostly heterosexual	n (%)	28 (23.93)
	Bisexual	n (%)	7 (5.98)

	Unknown	n (%)	3 (2.56)
Location of Birth	US	n (%)	92 (78.63)
	Asia	n (%)	23 (19.66)
	Unknown	n (%)	2 (1.71)
Location Raised	US only	n (%)	82 (70.09)
	US and abroad	n (%)	35 (29.91)
HIV Testing	Ever (Lifetime)	n (%)	60 (51.28)
	Never	n (%)	57 (48.72)
	Time since last test (years)*	Mean ± sd	1.63 ± 1.89
		Median	0.90
		Min: Max	0.02 : 9.16
*Among those who have been tested for HIV.			

Table 1: Participant Characteristics (n=117).

Table 1 shows the socio-demographic characteristics and lifetime prevalence of HIV testing among respondents. The sample consisted of 117 Asian-American women, with a median age of 23.73 years (range: 18-34). Participants were highly educated. The majority had obtained at least some post-secondary education (94.02%); of these, 15% attained some graduate level education. Fifty-six percent of the sample identified as Chinese, 17% as Korean, 12% as Vietnamese, and 15% Multiple/Other. Seventy-nine percent were born in the U.S. and 70% were raised in the U.S. exclusively. Approximately 68% of participants identified as exclusively heterosexual. Of the 117 participants, approximately half (51.28%) reported receiving HIV testing in their lifetime. Among those who received HIV testing, the mean time since their last test was 1.63 years, with a standard deviation of 1.89 years. The median time since their last HIV test was 0.9 years.

Category	Statement	Correct Response (True [T] or False [F])	n (% correct)
(A) HIV *vs.* AIDS	HIV and AIDS are the same thing. (A)	F	104 (88.89)
	AIDS is the cause of HIV. (A)	F	71 (60.68)
	A person can be infected with HIV for 5 years or more without getting AIDS. (A)	T	84 (71.79)
	Mean score	73.79	
(B) Treatment	There is a cure for AIDS. (B)	F	103 (88.03)
	A person can get HIV from a toilet seat. (B)	F	98 (83.76)
	HIV is killed by bleach. (B)	T	13 (11.11)
	If a person tests positive for HIV, then the test site will have to tell all of his or her partners. (B)	F	60 (51.28)
	Some drugs have been made for the treatment of AIDS. (B)	T	90 (76.92)
	Mean score	56.84	
(C) Trans-mission (general)	Coughing and sneezing DO NOT spread HIV. (C)	T	99 (85.34)
	HIV can be spread by mosquitoes. (C)	F	58 (50.00)
	A person can get HIV by sharing a glass of water with someone who has HIV. (C)	F	102 (87.18)
	It is possible to get HIV when a person gets a tattoo. (C)	T	95 (81.90)
	A person can get HIV by giving blood. (C)	F	36 (30.77)
	A person can get HIV by sitting in a hot tub or a swimming pool with a person who has HIV. (C)	F	86 (73.50)
	A person can get HIV through contact with saliva, tears, sweat or urine. (C)	F	75 (64.10)
	Athletes who share needles when using steroids can get HIV from the needles. (C)	T	109 (93.16)
	Mean score	72.37	
(D) Trans-	A pregnant woman with HIV can give the virus to her unborn baby. (D)	T	102 (87.18)

mission (sexual activity & pregnancy)	Pulling out the penis before a man climaxes/cums keeps a woman from getting HIV during sex. (D)	F	110 (94.02)
	A woman can get HIV if she has anal sex with a man. (D)	T	91 (77.78)
	Showering, or washing one's genitals/private parts, after sex keeps a person from getting HIV. (D)	F	105 (89.74)
	All pregnant women infected with HIV will have babies born with AIDS. (D)	F	90 (76.92)
	A person cannot get HIV by having oral sex, mouth-to-penis, with a man who has HIV. (D)	F	84 (71.79)
	A person can get HIV even if she or he has sex with another person only one time. (D)	T	106 (90.60)
	People are likely to get HIV by deep kissing, putting their tongue in their partner's mouth, if their partner has HIV. (D)	F	84 (71.79)
	A woman can get HIV if she has vaginal sex with a man who has HIV. (D)	T	109 (93.97)
	A woman cannot get HIV if she has sex during her period. (D)	F	104 (88.89)
	Having sex with more than one partner can increase a person's chance of being infected with HIV. (D)	T	106 (90.60)
	A person can get HIV from a woman's vaginal secretions/wetness from her vagina. (D)	T	60 (51.28)
	A person can get HIV if having oral sex, mouth on vagina, with a woman. (D)	T	63 (53.85)
	Mean score	79.71	
(E) Prevention	Eating healthy foods can keep a person from getting HIV. (E)	F	106 (91.38)
	Using a latex condom or rubber can lower a person's chance of getting AIDS. (E)	T	109 (93.97)
	There is a vaccine that can stop adults from getting HIV. (E)	F	69 (58.97)
	Women are always tested for HIV during their pap smears. (E)	F	48 (41.03)
	Using a lambskin condom or rubber is the best protection against HIV. (E)	F	52 (44.44)
	There is a female condom that can help decrease a woman's chance of getting HIV. (E)	T	55 (47.01)
	A natural skin condom works better against HIV than does a latex condom. (E)	F	67 (57.26)
	A person will NOT get HIV if she or he is taking antibiotics. (E)	F	95 (81.90)
	Taking a test for HIV one week after having sex will tell a person if she or he has HIV. (E)	F	50 (42.74)
	Using Vaseline or baby oil with condoms lowers the chance of getting HIV. (E)	F	92 (78.63)
	Washing drug use equipment/"works" with cold water kills HIV. (E)	F	97 (82.91)
	Douching after sex will keep a woman from getting HIV. (E)	F	102 (87.18)
	Taking vitamins keeps a person from getting HIV. (E)	F	108 (93.91)
	Mean score	70.67	
(F) Symptoms	A person with HIV can look and feel healthy. (F)	T	107 (91.45)
	People who have been infected with HIV quickly show serious signs of being infected. (F)	F	91 (77.78)
	You can usually tell if someone has HIV by looking at them. (F)	F	113 (96.58)
	Mean score	88.60	
Overall mean score		74.66	

Percent correct excludes individuals with missing data.

Table 2: HIV Knowledge Questionnaire (45 items), frequency of correct responses by category and overall (n=117).

The average score on the HIV HQ-45 was 74.66% (33.5 of 45 statements correctly identified). More than half of the participants correctly identified 36 (80.0%) of the statements.

Respondents were most knowledgeable about "Symptoms" (mean score 88.60%), but demonstrated more notable gaps in knowledge related to "Transmission, sexual activity & pregnancy" (mean score 79.71%); "HIV *vs.* AIDS" (73.79%); "Transmission, general" (72.37%); "Prevention" (70.67%); and "Treatment" (56.84%). The low mean scores for the Treatment and Transmission, General categories were due to incorrect responses to a single statement in each section: only 11.11% of the women correctly identified "HIV is killed by bleach" as a true statement, and 30.77% correctly identified "A person can get HIV by giving blood" as a false statement. All other statements in these categories were answered correctly by at least half of the participants. On the other hand, the low mean scores in the Prevention and Transmission (sexual activity & pregnancy) categories were due to a lack of subject knowledge. In the Prevention category, less than half of participants correctly assessed 4 of the 13 statements in this category as true or false. Specifically, these statements were: "Women are always tested for HIV during their pap smears" (false, 41.03% correct); "Taking a test for HIV one week after having sex will tell a person if she or he has HIV" (false, 42.74%); "Using a lambskin condom or rubber is the best protection against HIV" (false, 44.44%); and "There is a female condom that can help decrease a woman's chance of getting HIV" (true, 47.01%). In the Transmission (sexual activity & pregnancy) category, 2 of the 13 statements were correctly assessed as true or false by about half of the participants. Specifically, these statements were: "A person can get HIV from a woman's vaginal secretions/wetness from her vagina" (true, 51.28% correct); and "A person can get HIV if having oral sex, mouth on vagina, with a woman" (true, 53.85%). In the HIV *vs.* AIDS category, just under half of the participants correctly identified all three statements as true or false.

Category	Unadjusted Odds Ratio* (95% CI)	p-value
(A) HIV *vs.* AIDS	1.51 (1.01, 2.27)	0.0470
(B) Treatment	1.46 (0.98, 2.17)	0.0655
(C) Transmission (general)	1.21 (1.00, 1.46)	0.0513
(D) Transmission (sexual activity & pregnancy)	1.23 (1.04, 1.46)	0.0180
(E) Prevention	1.19 (1.03, 1.37)	0.0191
(F) Symptoms`	1.76 (0.96, 3.25)	0.0685
Overall	1.34 (1.02, 1.75)	0.0342
*OR represents a one-unit increase in correct response for each category and a five-unit increase in correct responses for the overall. Participants with missing responses are excluded from those respective categories.		

Table 3: Relationship between HIV Knowledge and HIV testing (n=117).

In unadjusted analyses, higher HIV knowledge in all categories was associated with increased odds of testing (refer to Table 3). For instance, each correct response in the Prevention category was associated with a 19% greater chance of ever receiving HIV testing (OR = 1.19, 95% CI = 1.03-1.37). Categories with fewer questions tended to have higher odds associated with each correct response. For instance, the Symptoms category comprised only 3 statements and each correct response was associated with 76% greater odds of testing (OR = 1.76, 95% CI = 0.96-3.25). When considering HIV knowledge overall, having five additional correct responses was associated with 34% greater odds of ever being tested for HIV (OR=1.34, 95% CI = 1.02-1.75).

Parameter	Time Period		Data Distribution* [n missing]	Unadjusted OR (95% CI)	p value	Fully Adjusted OR** (95% CI)	p value
HIV Knowledge Overall Score (/45)***	Baseline		33.60 (7.65) 6:44 [8]	1.34 (1.02, 1.75)	0.0342	1.26 (0.93, 1.71)	0.1439
Needle Use	Ever	Injection drug use, skin popping or booting	0[8]	nc	nc	nc	
Sexual Behavior	Ever	Sexual intercourse	65 (55.56)[0]	1.45 (0.70, 3.01)	0.3216	0.95 (0.36, 2.51)	0.9173

		with a high risk partner****					
		Sex under the influence of drugs or alcohol	85 (73.91) [2]	1.54 (0.67, 3.57)	0.3112	1.09 (0.38, 3.16)	0.8701
		Oral sex	115 (98.29) [0]	1.05 (0.06, 17.25)	0.9708	nc	
		Anal sex	41 (36.28) [4]	4.55 (1.96, 10.53)	0.0004	2.69 (1.04, 6.94)	0.0407
	Past 3 months	More than 1 sexual partner	24 (20.51) [0]	0.94 (0.38, 2.30)	0.8879	nc	
		Never used condoms during vaginal sex	38 (32.48) [0]	6.13 (2.48, 15.10)	<0.0001	5.55 (1.91, 16.16)	0.0017
		Inconsistent condom use during sex	8 (88.89) [0]	nc	nc	nc	

OR odds ratio, nc not calculated, CI confidence interval

Participants with missing data excluded from frequencies and respective models for OR estimates.

*For continuous variables: mean, sd, min, max reported; categorical variable n, %

**Fully adjusted model controls for high risk sexual partner, sex under the influence of drugs and alcohol, ever had anal sex and frequency of condom use during vaginal sex, HIV knowledge score (n=103)

***OR represents a five-unit increase in correct responses

**** High risk partner was defined as prostitute, someone with HIV/AIDS, injection drug user and/or unknown sexual history

Table 4: Association between HIV knowledge, sexual risk and HIV testing (n=117).

Specific risk factors associated with HIV testing included ever having a "high risk" sexual partner (defined as intercourse with someone the women did not know well); sex under the influence of drugs and alcohol; anal sex; and never using condoms during vaginal sex. Ever using injection drugs, having more than one sexual partner in the past 3 months, and regularity of condom use with anal sex were also considered. No women in the sample were injection drug users. Having more than one sexual partner was not associated with lifetime HIV testing. Inconsistent condom use during anal sex was common among those who recently had anal sex; however, it occurred rarely in the overall sample and so could not be evaluated for its association with HIV testing.

Upon adjusting for the aforementioned risk factors, the relationship between HIV knowledge and testing was attenuated (adjusted OR = 1.26, 95% CI = 0.93-1.71). The results suggest that Asian American women who tend to engage in multiple high-risk behaviors are more likely to receive HIV testing. In the fully-adjusted model, the associations between individual high-risk sexual behaviors and HIV testing were weakened or no longer present, except for never using condoms during vaginal sex (adjusted OR = 5.55, 95% CI = 1.91-16.16) and ever engaging in anal sex (adjusted OR = 2.69, 95% CI = 1.04-6.94), which were both still strongly associated with lifetime testing.

Discussion

Our results indicate that one in two (51.3%) young sexually active Asian-American women in our sample have tested for HIV across their lifetime. This rate is higher than those seen in other published reports, which ranged from 14%) to 33.2% [4,14]. However, the large confidence intervals reported in recent studies point to a need for more research in this area [15,32].

The comparatively higher rates of HIV testing observed in our sample may be due to higher than average education attainment. The majority of our sample (94%) is currently in college, in graduate school or graduated from college or graduate school. Thus, they may have had greater access to information about HIV and testing on campus. Despite these advantages, the lifetime HIV testing rate of 51.3% in our sample is equivalent to, or lower than, the rates seen in other racial/ethnic groups. A study using National Health Interview Survey (NHIS) data from 2013 and 2014 found lifetime testing rates of 54.8% among Hispanic/Latinx Americans and 70.3% among Black Americans [33].

There are no studies of AA women to which we can directly compare our observed HIV knowledge scores using the same measure. A recent study of college students, primarily White, reported a mean score of 76% using the HIV-KQ-45 assessment, similar to our mean score of 74.7%. In our unadjusted model, the overall odds of HIV testing were higher among women with higher HIV knowledge scores (OR = 1.34, 95% CI = 1.02-1.75; p = 0.0342). This suggests that greater knowledge may indeed be associated with increased likelihood of HIV testing in AA women. However, based on our data, it is hard to say if any one type of knowledge is more helpful than others; a larger sample size may be needed to detect this.

Though participants were reasonably educated regarding HIV symptoms (HIV KQ-45: 88.60% correct), they showed a deficit in knowledge about methods and types of treatment (HIV KQ-45: 56.84% correct). These results are consistent with earlier studies showing that, while AA women may have basic knowledge regarding transmission, they know less about specific details, such as CD4 count and HIV services [1].

After controlling for sexual risk factors, the association between HIV knowledge and testing was slightly attenuated in our study, suggesting that some of the association between HIV knowledge and testing may be explained by the risk status of the women. The associations between these risk behaviors and lifetime testing were also attenuated, which could suggest that HIV knowledge is a mediator of these relationships. Although these women engage in high risk behaviors, it is possible that higher testing rates are due to the fact that they are more knowledgeable and aware of their increased risk of contracting HIV. This would explain why, after adjusting for these behaviors, HIV knowledge is not as strongly associated with HIV testing.

Our results also showed a reactive, rather than proactive, tendency towards HIV testing, where women who engaged in several high-risk behaviors had higher odds of HIV testing. Given the cross-sectional nature of the data, it is difficult to establish the directionality of this association. These data, however, suggest that AA women were more likely to engage in testing only after they have participated in activities which put them at a higher risk of infection. Aggressive, culturally informed education about the importance of early testing may be necessary to ensure that women engaging in these behaviors are tested before risk becomes too high.

Low testing rates in AA women may be a result of avoidance of sexual health discussions at home, reduced help-seeking behaviors, and fears relating to confidentiality or family shame, particularly among women exhibiting sexual risk behaviors. Our exploratory results showed that, consistent with other study findings, only a small proportion (9.4%) of participants received HIV education from family members [34]. The majority (84.6%) of our sample relied on information from their schools; 42.7% reported receiving information from medical doctors. This may be problematic as school sexual education programs, which is where the majority of the sample reportedly attained their HIV/AIDS knowledge, could fail to properly prepare, educate, and screen for risk.

Other strategies to reduce barriers to HIV testing and treatment include community education on HIV/AIDS stigma, assurance of confidentiality by providers and educators, and, though not directly supported by this research, increased cultural sensitivity and access to take-home materials, such as home testing kits [35]. Improved knowledge about safer sex practices may result in earlier treatment and reduction in future transmissions of HIV.

There were certain limitations to this study. For one, conclusions as to cause and effect cannot be definitively drawn due to this study's cross-sectional design. Additionally, our definition of "high risk," though consistent with those used in other studies and CDC recommendations, is not a universal definition because one has not been clearly established. Our small sample size also limited the number of covariates we could include in the final model; other than high-risk behaviors, we did not control for other factors that may be potential confounders of the association between knowledge and testing, such as age or ethnicity. However, while other studies may have a larger sample size, they also often used laxer demographic eligibility criteria, which could increase the potential for confounding factors [36]. Selection bias may affect the generalizability of our findings as well. The women in our study agreed to participate in an intervention and were recruited from a university setting. Therefore, they may have been more health-conscious and educated overall, making them both more knowledgeable and more likely to be tested. This might explain the differences in testing rates between our sample and prior studies.

Conclusion and Recommendation

With their rise in HIV transmission rate and rapid population growth, Asian-Americans are an important target for support in the effort to eradicate HIV transmission and infection. For young AA women, culturally specific factors such as power dynamics in gender and sexual relationships are salient. One study found that AA women are less likely to use a condom when they have low perceptions of power in their heterosexual relationships, which suggests that when women have greater perceptions of power, they practice safer sex and use condoms at higher rates [5]. Since sexual practices differ from group to group, exposure will remain persistent if interventions are wrongly thought to be universal. Future studies should further characterize cultural factors affecting sexual practices in this group, as well as propose and test culturally adapted HIV educational interventions designed to increase knowledge and testing rates.

Funding

Funding for this study was provided by the NIH grant NIMH (R34MH0999-01A1) (PI: Hyeouk Chris Hahm). NIH played no role in the study design, collection, analysis or interpretation of the data, writing the manuscript or the decision to submit the paper for publication.

Conflicts of Interest

All authors declare that they have no conflicts of interest.

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Received date: November 09, 2023; **Accepted date:** December 25, 2023; **Published date:** December 31, 2023

Citation: Hahm HC, Petersen JM, John R, Rivera A, Ahuja N, Cha D, Chen J (2023) HIV Knowledge, Risk Behaviors, and Testing Among Chinese-, Korean-, and Vietnamese-American Women. *J Health Sci Educ* 7(5): 243.