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HIV Testing in Non-Injection Drug Users: Prevalence and Associated Factors

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SUMMARY: The objective of this study was to estimate the prevalence of and identify factors associated with lifetime testing for the human immunodeficiency virus (HIV) in non-injection drug users (NIDU). A cross-sectional study was conducted with 323 individuals in clinics for chemical dependency in the state of Goiás in the Central-West region of Brazil. Logistic regression analysis was used to identify factors associated with lifetime HIV testing. Testing for HIV was associated with age, female gender, crack use, history of sexually transmitted infections, acquaintance with people living with HIV/AIDS and/or who had died from AIDS, and history of having received some instruction on HIV/AIDS prevention methods. It was found that only 26.6% reported having access to the HIV rapid test. We concluded determinants for HIV testing must be taken into account when planning prevention and programming strategies. These include the widening of testing coverage among NIDU, educational health actions, establishment of links between sexually transmitted infection prevention services and addiction treatment services, and the use of rapid tests to help people who are in contact with the virus learn about their HIV status, enter treatment, and improve their quality of life.

INTRODUCTION

Infections caused by the human immunodeficiency virus (HIV) represent a large public health problem worldwide. It is estimated that 35.3 million people throughout the world live with HIV (1). This infection is more prevalent among certain subpopulations, such as men who have sex with men (2), sex workers (3), injection drug users (IDU), and non-injection drug users (NIDU) (4–7).

NIDU exhibit several risk behaviors for acquiring HIV, such as polysubstance use, inconsistent use of condoms, sex work, and multiple sexual partners (8–10). Studies have shown elevated prevalence of HIV infection among NIDU worldwide, ranging from 3.7% in México to 16.0% in the United States of America (11–15).

Access to HIV testing permits infected individuals to receive early treatment, thus increasing survival rates and reducing morbidity and mortality associated with the virus (16,17). Furthermore, the knowledge of serological status contributes to reducing risk behaviors and viral transmission (17,18). The rate of HIV transmission is estimated to be 3.5 times greater among individuals who are unaware of their serologic status (19). It is estimated that approximately 50% of people infected with HIV throughout the world are unaware of their serological status (20).

Low perception of risk, lack of knowledge, and the stigma associated with HIV represent significant barriers to testing (21–23), contributing to these rates.

Studies have indicated factors associated with HIV testing, namely sociodemographic characteristics (24–26), sexual risk behaviors, history of sexually transmitted infections (STI) (25,27), self-perceived HIV risk (28), and knowing people living with HIV/AIDS (PLHA) and/or someone who had died from AIDS (24,29,30). These determinants must be taken into account when planning healthcare actions and broadening coverage of the testing for those most vulnerable, such as NIDU. Thus, the aim of this study was to estimate the prevalence and factors associated with lifetime HIV testing in NIDU.

METHODS

Design, population and period of the study: This was a cross-sectional study conducted with NIDU at 2 reference clinics for the treatment of chemical dependency, located in a city in the state of Goiás, Central-West region of Brazil. The study institutions offer assistance for users of alcohol and illegal drugs (injection and non-injection), including outpatient treatment (medical appointments, support groups, etc.) and hospitaliza-

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tions for the treatment of mental and behavioral disorders due to psychoactive substances, either free through the Brazilian National Health System (Sistema Único de Saúde) or privately. Data were collected from December 2014 to June 2015.

Inclusion and exclusion criteria: Individuals 18 years or older, who, according to self-reports, had used illicit non-injection drugs during the month prior to being admitted, and were hospitalized with a medical diagnosis of mental and behavioral disorders due to psychoactive substances (except alcohol and tobacco) according to the ICD-10 (31) which was verified from the medical records were included in the study. Individuals who were in a state of sedation or apparent agitation prior to the interview, and injecting drug users were excluded.

Data collection procedure: After obtaining permission from the directors of the clinics, all of the eligible individuals were invited to take part in the study. For recruitment, the directors provided a daily list of individuals hospitalized in the institutions. Next, the participants were individually and anonymously invited by members of the study team.

After explanation of the aims, methods, benefits and potential risks of the study, the participants who signed the Informed Consent form were interviewed in a private setting, using a standardized instrument to gather information on sociodemographic characteristics, HIV testing, illicit drug use, sexual behavior, history of STI, and self-perceived HIV risk. In addition, individuals who had been previously tested at some point in their life answered a series of questions on the reasons for testing as well as the type, place, and results of the test.

The questionnaire was constructed by the researchers and included variables derived from instruments previously validated in vulnerable populations (10,11,24,26,27,30,32–39) and other potential factors associated with HIV testing. The interviews were conducted by members of the study team who were professional experts in mental health and had been previously trained.

Variables: i) Outcome variable: Data regarding lifetime HIV testing status was obtained through the question: Have you ever been tested for HIV/AIDS? **ii) Predictor variables:** The following predictor variables were considered: I) Sociodemographic characteristics: age (continuous variable), gender (male vs. female), and marital status (singles vs. married vs. divorced/widowed). II) Illicit drug use (no vs. yes): marijuana, intranasal cocaine, crack, non-injection heroine, d-lysergic acid diethylamide (LSD), and inhalants. III) Sexual behavior: sexual orientation (heterosexual vs. homosexual/bisexual), sex work (no vs. yes), inconsistent condom use during sexual relations (no vs. yes), sexual relations under the influence of drugs (no vs. yes), group sexual relations (no vs. yes), sexual relations with PLHA (no vs. yes). Sex work was defined as exchanging sexual relations for money or drugs (40), within the previous year, and the data were obtained through the question: Have you received money and/or drugs in exchange for sex in the last year? Inconsistent condom use was defined as irregular (never or sometimes) use during sexual relations (oral, vaginal, and/or anal) with a regular and/or casual partner, within the previous year (10). Questions used to verify other sexual practices were: Have you used illegal drugs before or during sex in the last year?; Have you taken part in group sex (with more than one person) in the last year?; and Have you had sex with someone infected with HIV/AIDS in the last year?" IV) Data regarding history of STI (no vs. yes) were obtained by the following question: Have you ever been diagnosed with a STI/venereal disease in your life? V) HIV/AIDS-related personal experiences and risk perception: knowing PLHA and/or someone who had died from AIDS (no vs. yes), and self-perceived risk for acquiring HIV. Self-perceived HIV risk was categorized as: do not know; no risk; medium risk; and high risk (27). VI) Health service use: Data regarding receipt of guidance on HIV/AIDS prevention methods in the previous year (no vs. yes) were obtained through the question: Have you received counseling on HIV/AIDS prevention methods from a health professional in the last year? **iii) Additional variables:** Individuals who reported lifetime HIV testing, answered the following questions: Have you been tested for HIV/AIDS in the last year?; What was the test result?; Did you receive pre- and post-test counseling?; What was the location of your last test?; Was the rapid test used for your last test?; and For which reasons did you undergo the test?

Data analysis: The data were analyzed using the Statistical Package for the Social Sciences (SPSS, Chicago, IL, USA), version 22.0. Descriptive analysis was used to describe the sociodemographic characteristics of the participants. Prevalence of HIV testing patterns was estimated with a 95% confidence interval (95% CI). Factors associated with lifetime HIV testing were analyzed through multivariate logistic regression. First, bivariate analysis was conducted through simple logistic regression. Next, variables with $p < 0.10$ were included in the multivariate analysis. The potential confounders of age and gender were controlled for in the multivariate model. Pearson's chi-squared test (χ^2) was used to verify differences between proportions for the categorical variables, and Student's t-test was used for the continuous variables. Values of $p < 0.05$ were considered statistically significant.

Ethical aspects: The study was approved by the Research Ethics Committee of the Federal University of Goiás, Brazil, under authorization No. 926.819/2014. The investigation adhered to the guiding ethical principles for research involving human subjects in Brazil (41).

RESULTS

Sociodemographic characteristics and drug use patterns: All individuals admitted to the institutions

during the study period were invited to participate (n = 380). Of these, 15 refused to participate, 20 were sedated/agitated prior to the interview and 22 were injecting drug users, resulting in 323 NIDU investigated (85.0% of the total number of patients in the institutions).

Mean age of the participants was 32.4 years (SD ± 11.3). The majority were male (83.0%) and single (72.2%), and the most frequently self-declared skin color was brown/mulatto (59.3%). Participants reported using crack (75.9%), intranasal cocaine (47.2%), marijuana (51.5%), inhalants (26.5%), LSD (13.0%), ecstasy (12.7%), and non-injection heroine (3.7%) within the month prior to admission.

HIV testing: Table 1 presents the HIV testing patterns of the participants. The frequency of lifetime HIV testing was 48.9% (95% CI: 43.5–54.3%). Of these subjects, 26.6% reported use of the rapid test and 44.3% received pre- and post-testing counseling. Approximately half (46.8%) reported carrying out the test in a private health care service. Five individuals tested positive, which resulted in a prevalence of self-reported HIV infection of 3.2% (95% CI: 1.4–7.2%). The participants reported several reasons for undergoing the test, including exposure to situations of risk, curiosity, self-initiative, prenatal care, and requests from health professionals.

Bivariate analysis: In the bivariate analysis, age, gender, crack use, marijuana use, history of STI, knowing PLHA and/or someone who had died from AIDS, and having received guidance on HIV prevention methods were associated with the outcome ($p < 0.05$). The variables of intranasal cocaine use ($p = 0.05$) and group sexual relations ($p = 0.09$) were included in the multivariable model (Table 2).

Multivariate analysis: Table 3 presents the factors associated with HIV testing in the multivariable model. Thus, after adjusting for confounding variables, the outcome was associated with age (adjusted OR [AOR]: 1.03; 95% CI: 1.01–1.06), female gender (AOR: 2.08; 95% CI: 1.12–3.86), crack use (AOR: 2.11; 95% CI: 1.23–3.60), history of STI (AOR: 1.88; 95% CI: 1.12–3.15), knowing PLHA and/or someone who had died from AIDS (AOR: 1.88; 95% CI: 1.09–3.23), and having received guidance about HIV/AIDS prevention methods (AOR: 2.22; 95% CI: 1.39–3.56).

Table 1. HIV testing patterns in non-injecting drug users. State of Goiás, Central-West region, Brazil. 2014–2015

Variable	*n*	%	95% CI[1)]
Lifetime HIV testing (n = 323)	158	48.9	43.5–54.3
HIV testing in the previous year (n = 158)	54	34.2	27.2–41.9
HIV rapid test (n = 158)	42	26.6	20.3–34.0
Pre- and post-test counseling (n = 158)	70	44.3	36.8–52.1
Place of testing (n = 158)[3)]			
Private healthcare service	74	46.8	39.2–54.6
Public healthcare serviced[4)]	34	21.5	15.8–28.6
Primary health unit	34	21.5	15.8–28.6
Testing and counseling center	15	9.5	5.8–15.1
Blood bank	9	5.7	3.0–10.5
Test result (n = 158)			
Negative	145	91.8	86.4–95.1
Positive	5	3.2	1.4– 7.2
Do not know[2)]	8	5.1	2.6– 9.7
Reason for testing (n = 158)[3)]			
Exposure to situations of risk	45	28.5	22.0–36.0
Curiosity and self-initiative	43	27.2	20.9–34.6
Request from health professional	26	16.5	11.5–23.0
Prenatal care	14	8.9	5.4–14.3
Request from company/employer	13	8.2	4.9–13.6
Prior hospitalization	14	8.9	5.4–14.3
Blood donation	9	5.7	3.0–10.5
Request from partner	4	2.5	1.0– 6.3
HIV-positive partner	2	1.3	0.3– 4.5
Others	20	12.7	8.3–18.7

[1)] : 95% confidence interval.
[2)] : Individuals who reported having been tested, but did not know the test result.
[3)] : Multiple response variables.
[4)] : With the exception of primary health units and testing and counseling centers.

Table 2. Bivariate analysis of potential factors associated with lifetime HIV testing in non–injecting drug users. State of Goiás, Central–West region, Brazil. 2014–2015

Variable	HIV testing		Unadjusted odds ratio (95% CI)[2]	*p*
	n/total[1]	%		
Age (yr)			1.03 (1.01–1.06)	< 0.01
Gender				
Male	123/268	45.9	1.00	
Female	35/55	63.6	2.06 (1.13–3.75)	0.02
Marital status				
Single	112/233	48.1	1.00	
Married	23/51	45.1	0.88 (0.48–1.63)	0.70
Divorced/widowed	23/39	59.0	1.55 (0.78–3.09)	0.21
Crack use[3]				
No	27/78	34.6	1.00	
Yes	131/245	53.5	2.17 (1.27–3.68)	< 0.01
Intranasal cocaine use[3]				
No	75/171	43.9	1.00	
Yes	83/152	54.6	1.54 (0.99–2.39)	0.05
Marijuana use[3]				
No	67/157	42.7	1.00	
Yes	91/166	54.8	1.63 (1.05–2.53)	0.03
Inhalant use[3]				
No	115/238	48.3	1.00	
Yes	43/85	50.6	1.09 (0.66–1.79)	0.71
LSD use[3]				
No	138/281	49.1	1.00	
Yes	20/42	47.6	0.94 (0.49–1.80)	0.85
Ecstasy use[3]				
No	136/282	48.2	1.00	
Yes	22/41	53.7	1.24 (0.64–2.39)	0.51
Non–injection heroin use[3]				
No	152/311	48.9	1.00	
Yes	6/12	50.0	1.04 (0.33–3.31)	0.93
Sexual orientation				
Heterosexual	138/286	48.3	1.00	
Homosexual/bisexual	20/37	54.1	1.26 (0.63–2.50)	0.50
Sex work[4]				
No	93/200	46.5	1.00	
Yes	63/119	52.9	1.29 (0.82–2.04)	0.26
Inconsistent condom use with regular partner[4]				
No	8/15	53.3	1.00	
Yes	84/189	48.3	0.81 (0.28–2.35)	0.70
Inconsistent condom use with casual partner[4]				
Always	26/77	46.8	1.00	
Sometimes/never	66/137	48.2	1.05 (0.60–1.85)	0.84
Sexual relations under the influence of drugs[4]				
No	35/85	41.2	1.00	
Yes	119/230	51.7	1.53 (0.92–2.53)	0.10
Group sexual relations[4]				
No	82/183	44.8	1.00	
Yes	76/140	54.3	1.46 (0.94–2.27)	0.09
Sexual relations with PLHA[4,5]				
No	147/303	48.5	1.00	
Yes	8/14	57.1	1.41 (0.47–4.17)	0.52
History of STI[6,7]				
No	109/241	45.2	1.00	
Yes	49/82	59.8	1.79 (1.06–3.00)	0.03
Self–perceived risk for HIV				
None	46/91	50.5	1.00	
Low	53/105	50.5	0.99 (0.56–1.74)	0.99
Moderate	33/75	44.0	0.76 (0.41–1.42)	0.40
High	24/43	55.8	1.23 (0.59–2.56)	0.56
Knowing PLHA[5] and/or someone who had died from AIDS				
No	30/80	37.5	1.00	
Yes	128/236	54.2	1.97 (1.17–3.32)	0.01
Received guidance on HIV/AIDS prevention methods				
No	76/184	41.3	1.00	
Yes	81/137	59.1	2.05 (1.31–3.22)	< 0.01

[1] : The amount reflects the number of valid responses.
[2] : 95% confidence interval.
[3] : Previous 30 days.
[4] : Previous year.
[5] : People living with HIV/AIDS.
[6] : Sexually transmitted infections.
[7] : Lifetime.

Table 3. Factors associated with lifetime HIV testing in non–injecting drug users. State of Goiás, Central–West region, Brazil. 2014–2015

Factor	Odds ratio		*p*
	Unadjusted (95% CI)[1]	Adjusted[4] (95% CI)[1]	
Age (yr)	1.03 (1.01–1.06)	1.03 (1.01–1.06)	< 0.01
Female gender	2.06 (1.13–3.75)	2.08 (1.12–3.86)	0.02
Crack use	2.17 (1.27–3.68)	2.11 (1.23–3.60)	< 0.01
History of STI[2]	1.79 (1.06–3.00)	1.88 (1.12–3.15)	0.02
Knowing PLHA[3] and/or someone who had died from AIDS	1.97 (1.17–3.32)	1.88 (1.09–3.23)	0.02
Received guidance on HIV/AIDS prevention methods	2.05 (1.31–3.22)	2.22 (1.39–3.56)	< 0.01

[1] : 95% confidence interval.
[2] : Sexually transmitted infections.
[3] : People living with HIV/AIDS.
[4] : Adjusted for age and gender.

DISCUSSION

In Brazil, it is estimated that approximately 734,000 people live with HIV/AIDS (0.4% of the population) (42). In the Central-West region, as well as the rest of the country, the epidemiology of HIV infection is concentrated in populations with high-risk behaviors, including illicit drug use (7,42). Access to HIV testing for NIDU is fairly challenging and complex, due to the marginalization and stigmatization of this group (18). Thus, widening the coverage of HIV testing for this population is an important tool for the prevention and reduction of transmission among NIDU.

To our knowledge, this is the first study to assess the factors associated with HIV testing in NIDU in the Central-West Region of Brazil. In this study, the prevalence of HIV testing was 48.9%, higher than the rate estimated for the general Brazilian population (36.5%) (43). This was possibly due to an increased self-perception of vulnerability and risk behaviors in these individuals, as the study sample was composed of subjects undergoing treatment for addiction. When compared to other illicit drug users in Brazil, the prevalence of HIV testing was similar to that estimated in the cities of Rio de Janeiro (State of Rio de Janeiro, Southeast region) (42.0%) (37), São Paulo (State of São Paulo, Southeast region) (55.9%) (10), and Goiânia (State of Goiás, Central-West region) (54.4%) (44).

Sociodemographic factors, such as female gender and age, were associated with the outcome, which is in agreement with the results of other studies (24,26,32,45,46). Women have a higher prevalence of HIV testing owing to access through prenatal care services, whereas men have less access to health services (21,47). With regards to age, an increase in testing with increasing age was observed, suggesting greater exposure to risk situations with longer life. Furthermore, an association between HIV testing and increased age is expected in NIDU in treatment, because these individuals have more opportunities to be tested throughout their lives. The Centers for Disease Control and Prevention estimated that between 2006 and 2010 there was an increase in the diagnosis of new infections in older individuals, and a decrease in younger individuals aged 13 to 24 years (48). Thus, efforts should be made to increase testing in young populations of NIDU.

The results showed a positive association between crack use and HIV testing. Crack users present high rates of risk behaviors, such as sex work, multiple sexual partnerships, and inconsistent use of condoms (49). In addition, studies have indicated a strong association between crack use and HIV infection (49,50). Thus, such multiple exposures to risk factors may explain this high rate of testing among crack users.

Having a history of STI was associated with the outcome, as has been observed in other studies (25,27,34). The presence of STI increases the risk of contracting HIV (26) and also increases self-perceived risk (25). In addition, symptoms of some STI prompt engagement with healthcare services and thereby increase the likelihood of the suggestion of a test by a healthcare provider. A medical diagnosis of STI can also lead health professionals to request an anti-HIV test (25), increasing testing coverage in this subgroup.

In this study, knowing PLHA and/or someone who had died from AIDS was associated with HIV testing among NIDU, corroborating the results of other investigations (28,30). Individuals who received guidance on HIV/AIDS prevention methods were almost 3 times more likely to undergo the test for HIV. Educational activities related to infection and safe sex can motivate individuals to request the test, indicating that educational and health promotion strategies must be included when planning healthcare for drug users.

The present study showed that only 26.6% of the participants reported having access to the rapid test, indicating the need for this strategy to be broadened among this population. The low prevalence of the use of rapid tests and testing is due to test limitations in public counseling and testing centers (51). In Brazil, HIV testing is mainly offered in specialized centers, which promote access to free, confidential, anonymous and fast testing, followed by treatment in reference services in cases of positivity (51), this being scarce in private clinics, public substance abuse treatment clinics and primary health units. In this study, the rapid test was used more by individuals who reported having undergone the test in counseling and testing centers than by those who had the

test conducted in other health units ($p \leq 0.01$) (data not shown). The use of the HIV rapid test should be a priority in the prevention of HIV infection among groups difficult to access (47), such as drug users. Therefore, it is necessary to make rapid testing available at other sites, including substance abuse treatment clinics and primary health units, aiming to expand test coverage among NIDU. Furthermore, 46.8% of the individuals reported performing the test in the private healthcare network, which highlights the need to widen free access to the test. Finally, the prevalence of self-reported HIV infection was 3.2% (95% CI: 1.4–7.2%), similar to that estimated for NIDU in Argentina (14), Luxembourg (13), Spain (12), and Mexico (11). However, it was lower than that found in the USA (15).

The current study presents some limitations. First, the cross-sectional nature of the investigation does not allow causal relationships to be established. Second, the sample consisted only of individuals in treatment, which prevents the generalization of the results to other NIDU. Third, the data were self-reported, which can be influenced by memory and response biases. Despite these limitations, the study aimed to estimate the prevalence and factors associated with HIV testing in NIDU, which can contribute to adherence strategies and lead to increased coverage of testing among these individuals.

The results of this study have implications for future research and health promotion interventions. Efforts should concentrate on increasing the coverage of HIV testing in NIDU in order to achieve adequate test coverage (90% of the target population) (48), especially considering those with lower testing rates, such as males, younger individuals and those with less access to STI prevention services. The results of this study can support public policies for epidemic control in NIDU by promoting a link between STI prevention services and addiction treatment services. New studies with illicit drug users are needed to evaluate the coverage of testing in this population and the factors that interfere with access to STI prevention services for NIDU.

In conclusion, the prevalence of lifetime HIV testing among the investigated NIDU was 48.6%, higher than that estimated for the general population in Brazil. Prior testing was associated with age, female gender, crack use, history of STI, knowing PLHA and/or someone who died from AIDS, and having received guidance on HIV/AIDS prevention methods. The determinants for HIV testing must be taken into account when planning prevention and programming strategies, including the widening of testing coverage among certain subgroups; educational health actions; and links between STI prevention services and addiction treatment services in addition to the use of rapid tests to help people in contact with the virus learn about their HIV status, and, if positive, enter treatment and improve their quality of life.

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