Monitoring Drug Use Among HIV/AIDS Patients in Brazil: Should we Combine Self-Report and Urinalysis?
Monitoring Drug Use Among HIV/AIDS Patients in Brazil: Should we Combine Self-Report and Urinalysis?

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Abstract: Illicit drug use in HIV-infected patients can be linked to impairment of physical and mental health, low health-related quality of life, and suboptimal adherence to HIV treatment. This study aimed to evaluate the correlation of self-report illicit drug use, urinalysis for cocaine and cannabis metabolites, and severity of dependence among HIV-infected patients on antiretroviral therapy (ART) in a treatment center in Brazil. Four hundred and thirty-eight outpatients of an HIV referral center were interviewed and assessed for drug use (lifetime, last year and last month). Urinalysis was performed to detect the presence of cocaine and cannabis metabolites in urine samples. Overall agreement between self-report and urinalysis was almost 68% for cannabis and higher than 85% for cocaine. Positive urinalysis was significantly associated with more than once a week cannabis (p < .0001) and cocaine (p < .0001) use during the last-month. Severity of Dependence Scale (SDS) properly predicted positive cocaine urinalysis results (area under the curve [AUC] = .81, p = .0001). Frequency of cannabis and cocaine use, SDS score degree and positive urinalysis for both drugs were correlated. Our findings suggest that positive self-report is a reliable predictor of positive urine sample both for cannabis and cocaine, but since the agreement was not perfect, there is a role for urine drug screening in the care of patients with HIV-related conditions.

Keywords: Cannabis, cocaine, HIV, AIDS, self-report, urinalysis.

INTRODUCTION

Illicit drug use is common among HIV-infected individuals. Approximately half of a national sample of HIV-infected Americans reported a history of substance abuse [1]. In a large study (611 patients from 8 clinical care sites) in the United States, the most common drugs used were marijuana (12%) and crack-cocaine (5%). Seven percent of them reported polysubstance use [2].

In Brazil, there are no consistent data about the prevalence of drug use in HIV positive individuals. Moreover, data about the impact of drug use in HIV treatment in Brazil is still scarce. In two studies, lifetime drug use was referred by 28 and 58% of the sample [3, 4].

Illicit drug use in HIV-infected patients can be linked to impairment of physical and mental health, low access to care, low health-related quality of life, suboptimal adherence to HIV treatment and poorer health outcomes than other HIV risk groups [5–8].

In clinical settings, patients’ self-report of drug use may not accurately correspond to their actual drug use behavior [9]. In order to increase the reliability of the assessment of substance use, various authors have recommended the use of urinalysis in addition to self-report, especially among populations at high risk for drug use [10-14].

Although biometric measures of substance use (e.g., urinalysis) may be perceived as a more accurate assessment of drug use compared to self-report, they also have limitations. First, the biometric measure uses a static snapshot of the biological state to infer a more general consumption level over a period of time [15]. The second limitation is that detection time windows for drugs in biological specimens are inexact, depending on quantity and frequency of use, route of administration, cutoff of the analytic technique, and characteristics of individuals such as metabolic rates [16].

Although self-report and urinalysis each have some limitations, their combination may improve the detection rate of drug use. Based on this premise, the present study aims to assess the relationship of urinalysis and self-report for cocaine and cannabis use among HIV-infected patients on antiretroviral therapy (ART).

MATERIAL AND METHODS

Study Subjects

This study was conducted at the HIV treatment center affiliated with the School of Medicine, University of São Paulo, Brazil. Since 1994, the center has been providing multidisciplinary care on HIV/AIDS. High complexity patients, with a wide range of physical problems, psychological and social consequences of HIV infection, are followed accordingly to the Brazilian Ministry of Health protocols.

In this service, 32 infectologists assess 8 patients per day. From the daily patients’ list, the first 5 patients were invited to participate in the study. This procedure was done daily until the sample was completed.
This is a secondary data analysis of data generated by a larger study that evaluated the adherence to ART. The inclusion criteria reflect this larger study [17].

Inclusion criteria were: age between 18-60 years, being on antiretroviral therapy, having HIV-related laboratorial data (CD4, cell count and viral load) within the last three months preceding the interview, and having a contact phone number.

Exclusion criteria were: clinical diagnosis of dementia or less than 24 points on the Mini-Mental State Examination (MMSE) [18].

The final sample included 438 patients (Fig. 1).

Interviews

Patients answered a questionnaire addressing lifetime, last-year and last-month drug use. Use during the last-month was further classified as less than once a week or use at least once a week. Only marijuana and cocaine use were assessed as they are the most common illicit drugs in Brazil. All the patients who reported any use during the last-year also answered the Severity of Dependence Scale (SDS) [19].

The SDS is a five-item questionnaire, each item scored on a four-point scale (from 0 to 3). This questionnaire was designed to measure the severity of dependence specifically related to self-evaluated feelings of impaired control over the use, preoccupation and anxiety towards drug use. The total SDS scores range from 0 to 15, with higher scores indicating a more severe level of dependence.

All interviews were conducted by trained psychiatrists or psychologists.

Urinalysis

Each patient was asked to provide a urine sample following the interview. These samples were submitted firstly to qualitative analysis of pH, creatinine concentrations, physical characteristics, and the presence of adulterants. Then, screening immunoassay tests for the presence of cannabis (delta-9-tetrahydrocannabinol-9-carboxylic acid, THCA) and cocaine (Benzoylcegonine) metabolites were performed. Positive screening results underwent Gas Chromatography/Mass Spectrometry (GC/MS) confirmatory analysis. All procedures of urinalysis were performed by the College of Pharmaceutical Sciences and Toxicology, University of São Paulo. Screening and confirmatory cutoffs for cannabis and cocaine were in accordance to the Mandatory Guidelines for Federal Workplace Drug Testing Programs [20]. Screening cutoff at immunoassay tests was 50 nanograms per milliliter (ng/mL) for THCA and 300 ng/mL for benzoylcegonine, with confirmatory GC/MS cutoffs of 15 ng/mL and 150 ng/mL, respectively.

Ethical Considerations

This study was approved by the Ethics in Research Committee of the Hospital das Clínicas, Medical School, University of São Paulo (Protocol number 654/05). All subjects included in the study gave written informed consent prior to their inclusion in the study.
Statistical Analyses

Chi-square tests were used for associations between Urinalysis and Self-report. Self-report drug use was presented as a dichotomous (no/yes) variable for lifetime, last-year and last-month use and as a three point variable (no use/less than once a week/once or more per week) for last-month use. Receiver Operating Characteristic (ROC) curve analysis was used to correlate urinalysis and SDS scores. Areas under the ROC curve (AUC) with 95% confidence interval and p values < 0.05 were considered significant. Only patients who reported use during the last-year were included in the analysis. Pearson’s correlations were done to analyze results between the following variables: frequency of drug use according to the three point variable of drug use; SDS scores, categorized as 0 (SDS equal zero), 1 (SDS up to two point threshold) and 2 (SDS higher than 2); urinalysis categorized as 0 (negative urinalysis), 1 (cannabis or cocaine positive urinalysis) and 2 (both cannabis and cocaine positive urinalysis). For statistical analysis, only subjects with last-year drug use were considered.

Analyses were performed with SPSS-16 for Windows statistical software package. The level of statistical significance was set at α = .05.

RESULTS

In discussing the results of the study, factors such as sociodemographic data, self-reports of substance use, drug use and urinalysis, degree of dependence according to SDS, and the correlation between frequency of drug use, SDS, and urinalysis must be reviewed and considered.

Sociodemographic Data

Four hundred and thirty-eight patients were included in the study and were assessed between July of 2006 and January of 2007. Two hundred and twenty-six (51.6%) were males and the mean age was 41.7 years (SD = 8.1, range 19-60). Almost 32% of the patients, (n = 139) lived with a partner and 299 (68%) lived alone. There were 331 patients (75.6%) who had up to eleven years of education and 107 (24.4%) more than 11 years. Nearly 62% were currently working (n = 271) and 167 (38%) were retired or on medical leave. Mean annual income was US$ 11,056 (SD = 10,428; range 1,283 - 91,397).

Sexual transmission was identified as the most likely source of infection by 359 (82%) patients. Close to 2% (n = 8) of the patients reported hemodialysis/transfusion as the most likely method of transmission and seventy-one (16%) patients did not know their mode of transmission. Sixteen patients reported lifetime injection drug use, but none associated this behavior to their HIV status.

Self-Reports of Substance Use

Because drug use is an important variable in HIV treatment, it is important to learn a patient’s self-reported history of substance use. Lifetime drug use was reported by 193 (44.1%) patients on ART, of which 180 (41.1%) reported having used cannabis (marijuana or hashish), 92 (21.0%) cocaine and 87 (19.8%) both.

A total of 62 patients (14.2%) reported last-year drug use. The prevalence of cannabis, cocaine and both drugs use within the last-year was 10.3% (n = 45), 6.8% (n = 30) and 3.9% (n = 17), respectively.

The prevalence of last-month drug use was 9.1% (n = 40), being 7.8% for cannabis (n = 34), and 3.7% for cocaine (n = 16). Last-month use of both drugs was reported by 2.3% (n = 10) of the sample. Less than once a week use was reported by 12 cannabis users (35.3%) and by 10 cocaine users (62.5%); 64.7% (n = 22) and 37.5% (n = 6) reported more than once a week use of cannabis and cocaine, respectively. Daily use was reported only by cannabis users (29.3%, n = 10).

Drug Use and Urinalysis

All the subjects of the study agreed to provide a urine sample. Associations between urinalysis and self-reported last-month use are shown in Table 1. Cannabis use once or more times per week in the last-month was significantly associated with a positive urinalysis (χ² = 25.59, p < .0001). Positive cocaine urinalysis and once or more per week cocaine use during the last-month were also significantly associated (χ² = 41.22, p < .0001).

Table 1. Urinalysis Results for Cannabis and Cocaine Metabolites and Self-Report of Last Month Drug Use

<table>
<thead>
<tr>
<th>Urinalysis</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>Last Month Cannabis Use</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1 (3.6)</td>
</tr>
<tr>
<td>Less than once a week</td>
<td>1 (8.3)</td>
</tr>
<tr>
<td>Once or more per week</td>
<td>14 (63.6)*</td>
</tr>
<tr>
<td>Last Month Cocaine Use</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1 (2.2)</td>
</tr>
<tr>
<td>Less than once a week</td>
<td>2 (20.0)</td>
</tr>
<tr>
<td>Once or more per week</td>
<td>6 (100.0)*</td>
</tr>
</tbody>
</table>

*p < 0.0001.

The disagreement between self-report and urinalysis involved a positive self-report and a negative urinalysis in most of the cases. Only on 2 cases such disagreement was between a negative self-report and a positive urinalysis.

Severity of Dependence According to the Severity of Dependence Scale

For the purposes of this study, it was important to understand a patient’s severity of dependence on drugs and its impact on the results of urinalysis. ROC analysis showed that SDS properly differentiated positive from negative cocaine urinalysis results, the best cutoff being 6 (AUC = .81, p = .0001). Regarding cannabis, the SDS did not associate with the urinalysis as the 95% Confidence Interval for the AUC crossed the mark of 0.5, which is random correlation.
Correlation Between Frequency of Drug Use, SDS Scores and Urinalysis

Finally, frequency of cannabis and cocaine use and degree of dependence as measured by the SDS and positive urinalysis for both drugs were correlated, suggesting collinearity among the variables. There is no correlation between frequencies of each drug use (Table 2).

DISCUSSION

The overall agreement on positive report between self-report and urinalysis above 85% for cocaine use suggests that self-report is a quite reliable assessment of recent cocaine use. Such notion is reinforced by the fact that the discrepancies were between positive self-reports and negative urinalyses (the reported use was not confirmed by toxicological urinalysis). The same conclusion applies to cannabis as the overall agreement on positive report for cannabis was lower than to cocaine mainly because of 8 clients with positive self-report and negative urinalysis. It is important to point out that subjects knew that they would be required to undergo a urine test.

However, the discrepancies between self-report and urinalysis can be explained by four hypotheses; (1) the clients have used the substance with minimal or no amounts of the active principle (fake or diluted); (2) the clients have used small quantities of the substance, rendering low levels of metabolites, below the detection threshold of the assay; (3) the time between substance use and the urine analysis was too long to detect the metabolites; (4) the clients provided false information about the consumption. This 4th hypothesis is quite unlikely as we cannot identify reasons or potential gains that patients would have to report use when such use did not actually happen. With the data from our study, the first three hypotheses are equally plausible.

It is noteworthy that the finding of positive self-report and negative urinalysis has also been reported in other samples. The methodological limitations of the urinalysis may have also played a role, although in the study reported by Harrison et al. [12], the screening and confirmatory cutoffs for cannabis metabolites (30 ng/mL and 5 ng/mL, respectively) were lower than those used in this study (50 ng/mL and 15 ng/mL). Such finding may also be explained by the influence of the timeframe utilized in different studies [21].

Next, another finding was that the severity of dependence measured by the SDS was associated to positive urinalysis for cocaine, but not for cannabis. Considering that urinalysis is associated with quantity and recency of use (aspects not assessed by the SDS), such lack of association could indicate that those parameters are not as good indicators of severity in cannabis dependence as they may be in cocaine dependence.

Another consideration is that, along with substance use, one of the major matters of concern is the association of two or more substances. Findings of this study show that having two different metabolites in urine was correlated with frequency and severity of drug use and degree of psychological impairment measured by the SDS. The positive relationship between psychological impairment and number of substances used has already been reported [22].

Finally, as noted previously, all of the subjects knew that their urine would be tested. This fact may have stimulated a true self-report use of drugs. In this context, urinalysis did not improve drug detection rate.

In conclusion, considering that drug use is an important variable in HIV treatment, the findings of this study suggest that HIV treatment centers may offer random urine drug screening to increase the accuracy of the information about drug use. Considering that patients’ self-report can be enhanced by knowing that such tests can be used at any time as part of the treatment program, we would suggest random selection test rather than testing all patients as such method would be cost-saving.

Some limitations of the present study must be discussed. Initially, the coercive power of the urinalysis on the intention to disclose drug use might bias self-reports. According to the protocol of the present study, the participants knew that their urine was going to be tested. Although such knowledge did not influence their intention to participate, since no patient refused to enter into the present study after reading the study protocol, it might have influenced their willingness to report substance use.

Although the sample was similar to the population treated in the service [23], subjects were not randomly selected from all HIV patients in Brazil. Therefore, the results of this study can be generalized to the population of our center, but further generalization is limited to similar populations.

CONCLUSION

Although self-report was overall more positive than urinalysis, knowing that a urine sample would be tested may have contributed to an open disclosure of drug use in the self-report. Given the relevance of this information on the

<table>
<thead>
<tr>
<th>Table 2. Correlations Among Frequency of Cannabis and Cocaine Last Month Use, SDS Scores and Positive Urinalysis Using Pearson’s r</th>
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<tbody>
<tr>
<td>Frequency of Last Month Cocaine Use</td>
</tr>
<tr>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Frequency of last month cocaine use</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Frequency of last month cannabis use</td>
</tr>
<tr>
<td>SDS</td>
</tr>
<tr>
<td>Positive Urinalysis</td>
</tr>
</tbody>
</table>

SDS = Severity of Dependence Scale.  
*p < 0.01.  
**p < 0.05.
treatment of this population, we suggest a random use of urinalysis in the care of patients with HIV-related conditions.

CONFLICT OF INTEREST

Authors confirm that this article content has no conflict of interest.

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PATIENT CONSENT

Declared none.

REFERENCES


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