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Andréa Costa Dias[I]

Marcelo Ribeiro Araújo[II]

Ronaldo Laranjeira[III]

Evolution of drug use in a cohort of treated crack cocaine users

ABSTRACT

OBJECTIVE: To analyze the evolution of drug use among treated crack cocaine users.

METHODS: A cohort originally comprising 131 crack addicts admitted to a detoxification unit in the city of São Paulo, Southeastern Brazil, between 1992 and 1994 were followed up on three occasions: 1995-96, 1998-99, and 2005-06. Variables investigated included demographical data, risky sexual behaviors, intake patterns for crack and other substances, incarceration, disappearance, and death. Statistical analysis was carried out using chi-square tests, multinomial logistic regression and Cox regression.

RESULTS: Among the patients evaluated, 43 were crack-free (12 months or longer), 22 were users, 13 were imprisoned, two were missing, and 27 were deceased. Three groups with distinct post-discharge drug use patterns were identified. Safe sexual behavior (condom use) was correlated with stable abstinence (p=0.001). Positive HIV test upon admission (p=0.046), use of snorted cocaine in the last year (p=0.001), and lifetime use of snorted cocaine (132 months or longer) (p=0.000) were associated with long term use of crack cocaine. History of intravenous cocaine use increased the probability of death at 12 years by 2.5 fold (p=0.031) (95%CI: 1.08; 5.79).

CONCLUSIONS: Recurrence and persistence of crack use in the years following discharge reflect new modalities of drug use. On the other hand, stable abstinence patterns provide evidence of the feasibility of recovery from crack addiction.

DESCRIPTORS: Drug Users. Crack Cocaine. Substance-Related Disorders, epidemiology. Cohort Studies.

INTRODUCTION

Longitudinal studies of trends in substance abuse are an essential tool for planning public health interventions. Notwithstanding, long-term follow-up studies of the consequences of crack cocaine use are still scarce.[3,7]

A topic of interest in recent years has been the longevity of crack cocaine use among treated and nontreated users, especially given its intensity, recurrence, and, in many cases, persistence.[13] These studies indicate that the use of crack cocaine is no longer an essentially short-term practice. Such a pattern raises the need for methodological and conceptual tools that allow for a better understanding of the complexity and evolution of phenomena related to crack cocaine use.

The documentation of different drug use trajectories[24] allows us to characterize heterogeneous groups, as well as to define groups that are more vulnerable to

[I] Departamento de Psiquiatria. Universidade Federal de São Paulo (Unifesp). São Paulo, SP, Brasil

[II] Instituto Nacional de Políticas do Álcool e Drogas. São Paulo, SP, Brasil

[III] Escola Paulista de Medicina. Unifesp. São Paulo, SP, Brasil

Correspondence:
Andréa Costa Dias
Rua Marselhesa, 272
Vila Clementino
04020-060 São Paulo, SP, Brasil
E-mail: andreaabead@uol.com.br

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health-related disorders and factors that are associated with stable abstinence.[14]

The aim of the present study was to investigate the evolution of crack cocaine use among treated users.

METHODS

We carried out a prospective study within a larger research project following a cohort of 131 crack cocaine users admitted to a detoxification unit in a general hospital in the North region of the city of Sao Paulo, Southeastern Brazil. Subjects were followed up two (1995-96), five (1998-99), and twelve (2005-06) years after discharge.[6,15,21]

This convenience sample was obtained from the admissions registry of the detoxification unit, and included patients consecutively admitted between May 1992 and December 1994. The criterion for inclusion was addiction to crack cocaine, diagnosed according to the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV). Diagnosis was established during a clinical interview with the team of psychiatrists responsible for admissions at the time.

We chose a study design that allowed us to follow a cohort of subjects for a long time so as to identify potential outcomes, such as death, disappearance, imprisonment (information obtained from relatives), and intake of or abstinence from crack cocaine (usage patterns in the last 12 years).

The hospital we investigated pioneered the specialized treatment of crack cocaine addiction within the public health care network in Sao Paulo in the early 1990s, at the onset of the crack cocaine epidemic in the city. Admissions were scrutinized by an interdisciplinary team (comprising psychiatrists, a psychologist, nurses, a social worker, and an occupational therapist), and lasted for two to three weeks.

Data were obtained from patient charts filled out at the time of admission and from in-person interviews using structured questionnaires.[22] The information obtained from patient charts included demographics, HIV/AIDS (tested upon admission), history of usage and prior admissions, intravenous drug use, and family history of chemical addiction. During the interviews, we investigated the following indicators: employment situation, schooling, risky sexual behavior, imprisonment, disappearance, death, occurrence and usage patterns for multiple substances (legal and illegal), lifetime use of crack cocaine and other substances, change of route of cocaine administration, peak period of crack cocaine use, and crack cocaine use trajectory (change in patterns throughout the 12-year period).

Intake data were self-reported. We considered use as sporadic when occurring up to two times per week; frequent when occurring three to four times a week; and heavy when occurring five to seven times a week.

The interviewer for the third follow-up was the same person that conducted the prior evaluations and was therefore known to the subjects. To improve the quality of these encounters, questionnaires were administered during home visits.

We confirmed the data on mortality and imprisonment by consulting official government records (State Data Analysis System Foundation [*Fundação Sistema Estadual de Análise de Dados*] and Program for the Improvement of Mortality Information [*Programa de Aprimoramento das Informações de Mortalidade*]).

For statistical analysis, the characteristics of the sample were described using simple frequencies and percentages. For quantitative variables, we calculated mean and standard deviation. To compare categorical variables, we used the chi-squared and Fisher's exact tests, with a significance threshold of 5%. For contingency tables larger than 2x2 and in which there was evidence of statistical association ($p<0.05$), we used residual analysis to identify categories that were different within the groups (standardized residuals > 1.96).

Mortality evaluation was carried out in two steps. In univariate analysis, stratified survival curves were tested and compared using the log-rank test, taking into account variables collected during admission for treatment. Three of these variables showed significant associations ($p<0.10$) and were tested using Cox regression including variables that could independently lead to increased risk of death. For the significant variable in the final model, we calculated relative risk and 95% confidence interval.

Using multinomial logistic regression (with stepwise forward inclusion), none of the variables in the admission chart remained as a predictive factor of stable abstinence or persistent intake.

Analyses were carried out using SPSS for Windows, version 13.0.

All procedures were approved by the Research Ethics Committee of the Universidade Federal de São Paulo (Process no.1420/05).

RESULTS

Twelve years after discharge, we were able to trace 107 (81.6%) of the 131 subjects in the initial sample. Of these, which 27 (20.6%) had died, two (1.5%) were missing, and 13 (10%) were imprisoned. The other 65 subjects (49.6%) were distributed among abstinent subjects and regular users of crack cocaine (for 12 months or more), with 43 (32.8%) and 22 (16.8%) subjects in each group, respectively.

Table 1. Profile of living and deceased subjects upon admission. São Paulo, Southeastern Brazil, 1992-2006.

Variable	Deceased (n=27)		Living (n=104)	
	n[a]	%	n[a]	%
Gender				
Male	26	96.3	89	86.4
Female	1	3.7	14	13.6
Age (years)				
15-19	8	29.6	30	29.2
20-24	6	22.2	41	39.8
25-29	6	22.2	14	13.6
30-34	3	11.1	9	8.7
35-39	3	11.1	5	4.8
40-42	1	3.7	4	3.8
Skin color				
White	19	70.4	78	76.4
Black	8	29.6	24	23.6
Marital status				
Single	18	66.7	68	66.6
Married	7	25.9	28	27.4
Divorced	2	7.4	6	6
Schooling (years)				
Less than 8	15	68.2	52	68.4
8 or more	7	31.8	24	31.6
Employed				
Yes	3	13.6	32	35.1
No	19	86.4	59	64.9

[a] Absence of data is due to missing entries in admission files.

The 24 subjects (18.3%) lost to follow-up could not be located by the researchers due to successive changes in address. Of these, two were evaluated only in the first follow-up (1995-96), seven only in the second (1998-99), 12 were interviewed in both follow-ups, and three could never be traced. There were no statistically significant differences between traced subjects and losses in terms of admission variables such as demographics, history of use of crack cocaine and other substances, prior treatment, legal problems, and HIV seroprevalence.

Of the 27 deaths (20.6% of subjects), 59% were violent (homicides). The second most frequent cause of death was AIDS (22%) (Table 1).

Of the variables recorded during admission, three were related to decreased probability of survival: years of schooling (p=0.044); prior use of intravenous cocaine (p=0.002); and positive HIV status (p=0.000). According to the Cox regression model, prior use of intravenous cocaine increased by 2.5 fold the risk of death in 12 years (p-0.031) (95%CI: 1.08; 5.79) (Figure).

In the 12 year period, abstinent subjects and crack cocaine users were divided in terms of marital status, with 43% being single and 37%, married. Mean age was 35 years, with 49% of subjects aged between 31 and 38 years. Only 15% of subjects were unemployed. Almost one-half of subjects (49.2%) did not study beyond elementary schooling, and 77% did not attend school in the year preceding the interview.

Regarding use of legal and illegal drugs in the year preceding the interview, the wide majority of subjects (n=45; 74%) reported sporadic alcohol consumption. Of these, 28 were abstinent from crack cocaine, and 17 were users. The same percentages were found for heavy tobacco use (n=45; 74%), also divided among abstinent subjects (n=28) and crack cocaine users (n=17). Most subjects did not use marijuana in the preceding year (n=42; 69%), divided into 31 abstinent subjects and 11 crack cocaine users. Among marijuana

Table 2. Use of legal and illegal drugs among abstinent subjects and crack cocaine users (last 30 days and last 12 months). São Paulo, Southeastern Brazil, 1992-2006.

Variable	Intake of legal and illegal drugs				p
	Abstinent subjects n = 43[a]		Users n = 22[a]		
	n	%	n	%	
Alcohol (30 days)					
Yes	25	61	14	66.7	0.661
No	16	39	7	33.3	
Nicotine (30 days)					
Yes	27	65.9	16	76.2	0.403
No	14	34.1	5	23.8	
Marijuana (30 days)					
Yes	8	19.5	7	33.3	0.229
No	33	80.5	14	66.7	
Snorted cocaine (30 days)					
Yes	5	12.2	10	45.5	0.003*
No	36	87.8	12	54.5	
Alcohol (12 months)					
No	13	31.7	3	15	
Nicotine (12 months)					
Yes	28	68.3	17	85	0.164
No	13	31.7	3	15	
Marijuana (12 months)					
Yes	10	24.4	9	45	0.103
No	31	75.6	11	55	
Snorted cocaine (12 months)					
Yes	7	17.1	15	71.4	0.000*
No	34	82.9	6	28.6	

[a] Absence of data for some variables is due to refusal to provide information or recall bias.
* p-value <0.05.

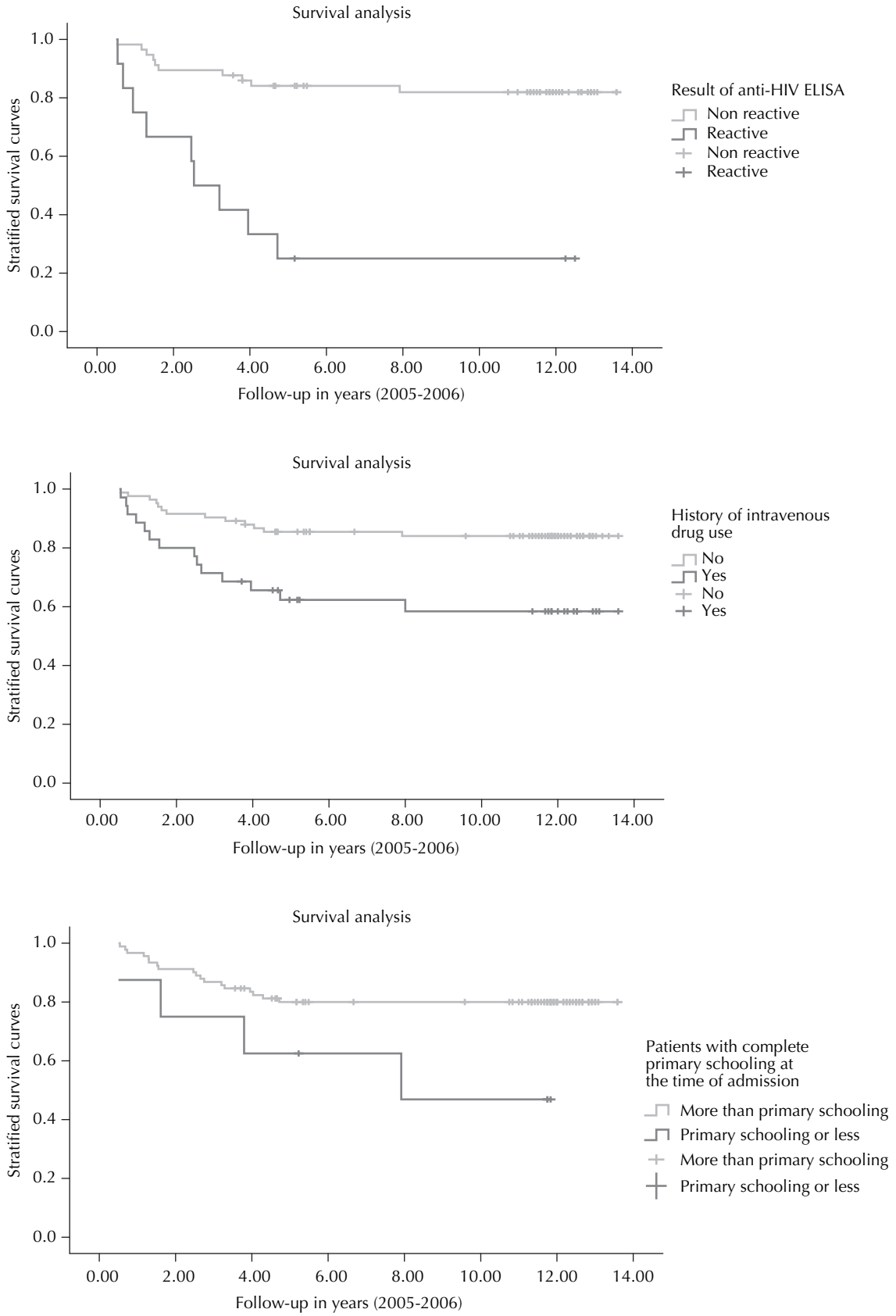

Figure. Survival curves stratified according to significant variables in the final Cox model. São Paulo, Southeastern Brazil, 1992-2006.

users, 39% showed sporadic use and 33%, intensive use. There was no significant difference between crack cocaine users and abstinent subjects in terms of use of alcohol, tobacco, and marijuana in the year preceding the interview (Table 2).

More than half the subjects (n=40; 64.5%) reported no use of snorted cocaine in the year preceding the interview. Among subjects who used snorted cocaine during this period, 68% reported frequent to heavy use. Former crack cocaine users (n=34) differed significantly from current crack cocaine users (n=6) with respect to abstinence from snorted cocaine use (p=0.000).

Use of the remaining substances – including amphetamines, hallucinogens, opioids, and intravenous cocaine – in the last year was not reported by any of the subjects.

The mean age of onset of snorted cocaine use was 18 years. Mean age of onset of crack cocaine use was 22 years, with no significant differences between users and abstinent subjects for both snorted and crack cocaine. There was a four-year interval between the onset of snorted cocaine and crack cocaine use.

Mean lifetime use of snorted cocaine and crack were 11 years, six months (140 months; SD=78.4) and eight years, ten months (106 months; SD=65.47), respectively. There was, therefore, a long-term simultaneous use of snorted and crack cocaine. Lifetime use of snorted cocaine ranged from frequent to heavy for 53% of subjects and use of crack cocaine was heavy for 74% of subjects.

Regarding the migration of routes of administration, snorted cocaine remained as the primary route employed by 88.5% (n=54) of subjects. The smoked route (crack) was the initial route of 9.8% (n=6) of subjects, and only 1.6% (n=1) began to use cocaine by the intravenous route.

Smoking (crack cocaine) remained as the second route of cocaine administration in 82% of subjects; only 12% used intravenous administration as their second route, and 7%, snorted cocaine. There was no transition to a third route in almost all subjects (81.5%). The alleged reason for moving from the first (snorted) to the second (crack) route was preference for the intensity of the effect (51%).

Approximately 12 months after the first use, users reached "binge" crack cocaine intake, with an individual average of 50 rocks (SD=5.3) in four consecutive days (SD=1.86).

Based on the information on the oscillation of use and/or on the periods of drug use and abstinence among subjects (diversity of usage patterns), we were able to discern three groups with distinct post-discharge usage patterns; (group 1; n=31) stable abstinent subjects: subjects reporting abstinence for at least five consecutive years; (group 2; n=20) intermediate: subjects alternating between periods of use and abstinence; and (group 3; n=14) prolonged users: subjects who sustained crack cocaine use throughout the 12-year period (Table 3).

Factors associated with sustained crack cocaine use in the 12-year follow-up period (group 3) included positive HIV test at admission (p=0.046); use of snorted cocaine in the previous year (p=0.001); and lifetime use of snorted cocaine > 132 months (p=0.000).

The only variable to differ significantly between stable abstinent subjects (group 1) (67.7% abstinent for five to ten consecutive years) and the intermediate (group 2) and prolonged use (group 3) groups was safe sexual behavior with condom use (p=0.001) (Table 4).

Age of onset of alcohol, tobacco, and marijuana use was distributed as follows: alcohol, 15 years (range = 5-34 years); tobacco, 15.5 years (range 10-32 years); and marijuana, 16 years (range 11-36 years). There was no statistically significant difference between abstinent subjects and crack cocaine users in terms of age of onset of these other substances (p=0.773, p=0.930, p=0.705, respectively).

Lifetime duration of alcohol, tobacco, and marijuana use were 19 (SD=6.6), 18 (SD=6.5), and 12 (SD=7) years, respectively, with no statistically significant differences between crack cocaine users and abstinent subjects. Lifetime use of marijuana was sporadic for 47% of users, and use of alcohol was frequent for 75% of users. Lifetime use of tobacco was heavy for 95% of users.

DISCUSSION

The present study describes the evolution of crack cocaine use in a cohort of treated users. This evolution is characterized by a high rate of mortality for violent causes, migration of administration routes, and lifetime use of legal (alcohol, tobacco) and illegal (marijuana, cocaine) substances. Periods of heavier consumption (50 rocks in four days) confirm the presence of "binge" patterns in this cohort. We were also able to define three groups with distinct consumption trajectories and their associated factors.

Use of other substances in addition to crack cocaine is frequent among users.[3,10] In the present study, reported use of other substances, both ever in life and in the previous year, confirmed this tendency, even though we were unable to clearly establish how these associations operate or their meaning.

It is estimated that subjects who seek treatment for cocaine use (in general) show high frequency of alcohol abuse.[7,1120] The combination of snorted cocaine and alcohol or crack cocaine and alcohol can be very

Table 3. Trajectory of crack cocaine use and admission variables. São Paulo, Southeastern Brazil, 1992-2006.

Variable	Crack cocaine use trajectory (2005-2006)						p
	Stable abstinence=31		Alternated abstinence and use n=20		Maintenance of use throughout the years n=14		
	n	%	n	%	n	%	
Underage when admitted (1992 - 1994)							
Underage (< 18 years)	7	22.6	4	20	1	7.1	0.456
Not underage (≥18 years)	24	77.4	16	80	13	92.9	
Civil emancipation when admitted (1992 - 1994)							
Under 21 years	12	38.7	8	40	2	14.3	0.217
21 years or older	19	61.3	12	60	12	85.7	
Gender							
Male	26	83.9	18	90	12	85.7	0.825
Female	5	16.1	2	10	2	14.3	
Skin color							
White	22	71	16	80	13	92.9	0.25
Black	9	29	4	20	1	7.1	
Marital status upon admission							
Single	20	64.5	16	80	8	57.1	0.682
Married	9	29	4	20	5	35.7	
Living with partner	1	3.2			1	7.1	
Divorced	1	3.2					
Employment upon admission							
Employed	9	37.5	6	33.3	5	45.5	0.807
Unemployed	15	62.5	12	66.7	6	54.5	
Patients with complete primary schooling at the time of admission							
Primary schooling or less	1	5	1	5.6			0.717
More than primary schooling	19	95	17	94.4	12	100	
Patients over age 15 years with complete primary schooling at the time of admission							
Primary schooling or less	13	72.2	12	66.7	6	50	0.447
More than primary schooling	5	27.8	6	33.3	6	50	
Patients over age 18 years that completed secondary schooling							
Secondary schooling or less	15	100	13	92.9	8	72.7	0.066
More than secondary schooling			1	7.1	3	27.3	
Occurrence of readmission for treatment (1992 - 1999)							
Yes	9	29	5	25	3	21.4	0.857
No	22	71	15	75	11	78.6	
Age at onset of crack cocaine use (years) [categorical]							
Under 18	10	35.7	7	35	2	14.3	0.32
18 or older	18	64.3	13	65	12	85.7	
Duration of crack cocaine use prior to admission (months)							
Up to 12	15	53.6	10	50	6	42.9	0.807
More than 12	13	46.4	10	50	8	57.1	
Previous use of intravenous drugs							
Yes	3	11.1	5	25	5	35.7	0.168
No	24	88.9	15	75	9	64.3	
Result of anti-HIV ELISA							
Reactive					2	25	0.046
Non-reactive	12	100	11	100	6	75	
Family history of substance addiction							
Yes	15	55.6	13	65	8	61.5	0.801
No	12	44.4	7	35	5	38.5	

Table 4. Trajectory of crack cocaine use and demographic and drug use profile. São Paulo, Southeastern Brazil, 1992-2006.

Variable	Crack cocaine use trajectory (2005-2006)						p
	Stable abstinence n = 31		Alternated abstinence and use n = 20		Maintenance of intake throughout the years n = 14		
	n	%	n	%	n	%	
Employed in the last year							
Yes	29	93.5	15	83.3	10	71.4	0.137
No	2	6.5	3	16.7	4	28.6	
Schooling							
Incomplete primary	9	29	5	27.8	4	28.6	0.785
Complete primary	4	12.9	4	22.2	5	35.7	
Incomplete secondary	4	12.9	2	11.1	1	7.1	
Complete secondary	8	25.8	6	33.3	1	7.1	
Incomplete university	3	9.7	1	5.6	2	14.3	
Complete university	2	6.5			1	7.1	
Technical degree	1	3.2					
Financial support from family or partner							
Yes	23	74.2	13	72.2	11	78.6	0.917
No	8	25.8	5	27.8	3	21.4	
Alcohol use in last 30 days							
Yes	18	58.1	12	66.7	9	69.2	0.725
No	13	41.9	6	33.3	4	30.8	
Nicotine use in last 30 days							
Yes	19	61.3	15	83.3	9	69.2	0.272
No	12	38.7	3	16.7	4	30.8	
Marijuana use in last 30 days							
Yes	4	12.9	6	33.3	5	38.5	0.110
No	27	87.1	12	66.7	8	61.5	
Hypnotic drug use in last 30 days							
No	31	100	18	100	13	100	_____
Amphetamine intake in last 30 days							
No	31	100	18	100	13	100	_____
Snorted cocaine use in last 30 days							
Yes	2	6.5	6	33.3	7	50 -2.6	0.003
No	29	93.5 -3.2	12	66.7	7	50	
Alcohol use in last 12 months							
Yes	20	64.5	15	83.3	10	83.3	0.248
No	11	35.5	3	16.7	2	16.7	
Nicotine use in last 12 months							
Yes	20	64.5	15	83.3	10	83.3	0.248
No	11	35.5	3	16.7	2	16.7	
Marijuana use in last 12 months							
Yes	6	19.4	8	44.4	5	41.7	0.128
No	25	80.6	10	55.6	7	58.3	
Snorted cocaine use in last 12 months							
Yes	3	9.7	9	50	10	76.9	0.001
No	28	90.3	9	50	3	23.1	

To be continued

Table 4 continuation

Variable	Crack cocaine use trajectory (2005-2006)						p
	Stable abstinence n = 31		Alternated abstinence and use n = 20		Maintenance of intake throughout the years n = 14		
	n	%	n	%	n	%	
Intravenous cocaine use in last 12 months							
No	31	100	18	100	12	100	_____
Inhaled drug use in last 12 months							
No	31	100	18	100	12	100	0.125
Opioid use in last 12 months							
Yes					1	8.3	0.125
No	31	100	18	100	11	91.7	
Hallucinogen use in last 12 months							
No	31	100	18	100	12	100	0.125
Sex without condom (during crack intake period/s)							
Yes	7	31.8	11	78.6	8	100	0.001
No	15	68.2	3	21.4			
Exchanged sex for drugs							
Yes	2	8.7	3	23.1	1	14.3	0.489
No	21	91.3	10	76.9	6	85.7	
Overdose related to crack cocaine use							
Yes	12	42.9	4	22.2	2	16.7	0.162
No	16	57.1	14	77.8	10	83.3	

different: while in the former case, alcohol generally tends to reinforce the positive effects of snorted cocaine, in the latter case, alcohol use takes place after crack cocaine use, as an attempt to "wet" the dryness of the mouth, "rebound" the intensity of the effects of crack cocaine, and/or counteract undesirable effects. Moreover, in late stages, alcohol tends to reduce the dose of crack cocaine used.[10]

Our analysis of lifetime use of snorted or crack cocaine showed that transition from the snorted form of the drug, more common at the onset of cocaine use,[11] to the smoked form did not necessarily lead to forfeiting of the initial route. When this was the case, we observed concomitant use of snorted and crack cocaine for a period of many years, especially among patients in group 3 (prolonged use). According to Guindalini et al[11] (2006), the combination of the two routes would characterize a distinct class ("dual" users), associated with greater occurrence of legal problems and greater risk to health. On the other hand, there is doubt as to the role played by snorted cocaine in the long-term maintenance of crack cocaine use. Such a correlation was detected, but not elucidated, in the present study. We do not know whether dependency was aggravated by the combination of the two substances, and therefore whether there was greater difficulty in interrupting the use and/or decreased consumption of crack secondary to snorted cocaine use (either in alternation or as a substitute), allowing the user to "stretch" crack cocaine use in the long term.[7]

The use of crack cocaine can follow a number of distinct trajectories, and its duration can vary from brief to prolonged periods.[12] In the present study, we detected prolonged cycles of use (group 2) and uninterrupted use of crack cocaine for many years (group 3 and lifetime use).

In the international literature, Falck et al[8] (2007) evaluated a cohort of 430 crack cocaine users, mostly males, over 18 years of age, with fixed residence and no pending criminal charges. The authors reported that, after an eight-year follow-up, 63% of subjects were still using the drug, indicating the viability of extended crack cocaine use for decades.

In Brazil, long term crack cocaine use tends to be stimulated by high availability (or profitability) and ease of access. Moreover, the formulation of the drug has undergone changes (in color, consistency, effect, and size), which resulted in "impure" preparations (lower addictive potential, greater addition of diluents).[19] Another aspect that plays a role in the longevity of crack cocaine use is the development of individual strategies for maintaining extended consumption patterns, albeit at lower intensity levels. Although heavy use is still the

norm rather than the exception,[7] there are studies (still incipient) that report moderate patterns of crack cocaine consumption[9] and its conciliation with daily activities.[a] Oliveira & Nappo[18] (2008) detected a trend among individuals that transitioned from compulsive patterns to more controlled use. According to these authors, the subjects themselves devised strategies for self-regulation such as, for instance, distancing themselves from the environment in which they used the drug, structuring daily and leisure activities, moderating the use of other "trigger" substances, or administering other drugs as substitutes for crack cocaine. Self-regulatory practices appear to indicate a dynamic process in which the user tests and accumulates experiences with regard to forms of use and their associated damage, relying on procedures aimed at reducing risks and actively building a culture of drug use.

A factor that was strongly correlated with long-term crack cocaine use was positive HIV testing upon admission. Maintenance of drug use by seropositive individuals raises the need for damage control strategies (consistent condom use, distribution of pipes, holders, and lip protectors) aimed at preventing HIV transmission and reinfection as well as other STDs (such as syphilis and gonorrhea). Crack cocaine abuse has been implicated not only as a risk factor for HIV infection, but also as a potential "catalyst" of disease progression among seropositive users.[1,4] Combined interventions (effect maximization) are recommended as a treatment for both problems. Regarding HIV, it is recommended that users be referred to testing and follow-up facilities and undergo constant monitoring of their adherence to antiretroviral treatment and of their motivation to care for their health and body.[2] With the exception of a positive correlation with safe sexual behavior (condom use), we were unable to identify other factors associated with stability of abstinence trajectories. Notwithstanding, the composition of a group of long-abstinent subjects (group 1) indicated the rupture of skepticism with respect to the impossibility of overcoming crack cocaine addiction and sustaining abstinence for an extended period.[16] In an attempt to understand the recovery process, studies in the literature seek to uncover indicators closely related to stable abstinence.[13,17] These include the study by Siegal et al[24] (2002), which showed a strong correlation between stable abstinence and prolonged detoxification treatment.

Regarding the cohort in the present study, effective forfeiting of crack cocaine use was seen to occur anywhere from early in treatment to much later in the process. Stable abstinence among treated crack users may establish itself both in the short term and after several years of treatment. A study conducted in the United States with a cohort of 1,271 drug users (64% of which used cocaine) estimated that the mean lag between onset of treatment and the last episode of drug use was nine years.[5] Scott et al[23] (2005) reported a range of three to four treatment episodes spread across a long time period before stable abstinence patterns were achieved. The expectation of early interruption of crack use (high expectation), in addition to promoting the divestment of care when unsuccessful, also compromises the trajectory of change, which might take years to occur.

Future investigations should attempt to elucidate the so-called "turning points," which are significant events in the life of users that tend to favor the interruption of crack cocaine intake. It will also be important to detect the moments in the life of individuals in which other mechanisms (related to health and social/cultural life) external to formal treatment play a supporting role in altering their exclusive relationship with the drug.

Limitations of the present study include the fact that our sample was obtained from a single treatment institution, the small proportion of women in our sample, and the absence of physical measurement of drug use. Other phenomena that are relevant to this field of study were not explored, such as pipe or holder sharing, combined use of crack and tobacco or crack and marijuana, and occurrence of tuberculosis and hepatitis.

The design of the current study did not allow us to conduct an in-depth analysis of issues related to the motivation of subjects to seek formal treatment. Neither could we investigate the consequences of treatment to the users' lives, including its potential contribution to stable abstinence. Furthermore, the factors involved in prolonged crack cocaine use could not be explored, likely because the measurements we made were not appropriate for detecting positive correlations that would allow us to explore these factors. If this is the case, a qualitative approach would be useful to help elucidate these aspects in depth, providing consistent indicators and goals to aid in the planning of drug-user care initiatives.

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[a] Silva SL. Mulheres da luz: uma etnografia dos usos e preservação no uso do crack [Tese de Doutorado]. São Paulo: Faculdade de Saúde Pública da USP; 2000.

REFERENCES

1. Baum MK, Rafie C, Lai S, Sales S, Page B, Campa A. Crack-cocaine use accelerates HIV disease progression in a cohort of HiV-positive drug users. *J Acquir Immune Defic Syndr*. 2009;50(1):93-9. DOI:10.1097/QAI.0b013e3181900129
2. Bell C, Metsch LR, Vogenthaler N, Cardenas G, Rodriguez A, Locascio V, et al. Never in care: characteristics of HIV-infected crack cocaine users in 2 US cities who have never been to outpatient HIV care. *J Acquir Immune Defic Syndr*. 2010;54(4):376-80. DOI:10.1097/QAI.0b013e3181d01d31
3. Buster MCA, Witteveen E, Prins M, van Ameijden EJC, Schippers G, Krol A. Transitions in drug use in a new generation of problem drug users in Amsterdam: a 6-year follow-up study. *Eur Addict Res*. 2009;15(4):179-87. DOI:10.1159/000228928
4. Celentano D, Sherman SG. The changing landscape of crack cocaine use and HIV infection. *CMAJ*. 2009;181(9):571-2. DOI:10.1503/cmaj.091574
5. Dennis ML, Scott CK, Funk R, Foss MA. The duration and correlates of addiction and treatment careers. *J Subst Abuse Treat*. 2005;28 (Suppl 1):S51-62. DOI:10.1016/j.jsat.2004.10.013
6. Dias AC, Ribeiro M, Dunn J, Sesso R, Laranjeira R. Follow-up study of crack cocaine users: situation of the patients after 2, 5 and 12 years. *Subst Abuse*. 2008;29(3):71-9. DOI:10.1080/08897070802218125
7. Falck RS, Wang J, Carlson RG. Crack cocaine trajectories among users in a midwestern American city. *Addiction*. 2007;102(9):1421-31. DOI:10.1111/j.1360-0443.2007.01915.x
8. Falck RS, Wang J, Carlson RG. Among long-term crack smokers, who avoids and who succumbs to cocaine addiction? *Drug Alcohol Depend*. 2008;98(1-2):24-9. DOI:10.1016/j.drugalcdep.2008.04.004
9. German D, Sterk CE. Looking beyond stereotypes: exploring variations among crack smokers. *J Psychoactive Drugs*. 2002;34(4):383-92.
10. Gossop M, Manning V, Ridge G. Concurrent use and order of use of cocaine and alcohol: behavioural differences between users of crack cocaine and cocaine powder. *Addiction*. 2006;101(9):1292-8. DOI:10.1111/j.1360-0443.2006.01497.x
11. Guindalini C, Vallada H, Breen G, Laranjeira R. Concurrent crack and powder cocaine users from São Paulo: do they represent a different group? *BMC Public Health*. 2006;6:1-7. DOI:10.1186/1471-2458-6-10
12. Han B, Gfroerer JC, Colliver JD. Associations between duration of illicit drug use and health conditions: results from the 2005-2007 national surveys on drug use and health. *Ann Epidemiol*. 2010;20(4):289-97. DOI:10.1016/j.annepidem.2010.01.003
13. Hser YI, Stark ME, Paredes A, Huang D, Anglin MD, Rawson R. A 12-year follow-up of a treated cocaine-dependent sample. *J Subst Abuse Treat*. 2006;30(3):219–26. DOI:10.1016/j.jsat.2005.12.007
14. Hser YI, Longshore D, Anglin MD. The life course perspective on drug use: a conceptual framework for understanding drug use trajectories. *Eval Rev*. 2007;31(6):515-47. DOI:10.1177/0193841X07307316
15. Laranjeira R, Rassi R, Dunn J, Fernandes M, Mitsushiro S. Crack cocaine: a two-year follow-up study of treated patients. *J Addict Dis*. 2001;20(1):43-8. DOI:10.1300/J069v20n01_05
16. Laudet AB, Savage R, Mahmood D. Pathways to long-term recovery: a preliminary investigation. *J Psychoactive Drugs* 2002;34(3):305-11.
17. McKay JR, Foltz C, Stephens RC, Leahy PJ, Crowley EM, Kissin W. Predictors of alcohol and crack cocaine use outcomes over a 3-year follow-up in treatment seekers. *J Subst Abuse Treat*. 2005;28(Suppl 1):S73-82. DOI: 10.1016/j.jsat.2004.10.010
18. Oliveira LG, Nappo SA. Caracterização da cultura de crack na cidade de São Paulo: padrão de uso controlado. *Rev Saude Publica*. 2008;42(4):664-71. DOI:10.1590/S0034-89102008005000039
19. Oliveira LG, Nappo SA. Crack na cidade de São Paulo: acessibilidade, estratégias de mercado e formas de uso. *Rev Psiquiatr Clin*. 2008;35(6):212-8. DOI:10.1590/S0101-60832008000600002
20. Pennings JM, Leccese AP, de Wolff FA. Effects of concurrent use of alcohol and cocaine. *Addiction*. 2002;97(7):773-83. DOI:10.1046/j.1360-0443.2002.00158.x
21. Ribeiro M, Dunn J, Sesso R, Lima MS, Laranjeira R. Crack cocaine: a five-year follow-up study of treated patients. *Eur Addict Res*. 2007;13(1):11-9. DOI:10.1159/000095810
22. Rousanville BJ, Tims FM, Horton AM, Sowder BJ, editors. Diagnostic source book on drug abuse research and treatment. Rockville: National Institute on Drug Abuse; 1993. (NIDA Research Monograph).
23. Scott CK, Foss MA, Dennis ML. Pathways in the relapse, treatment, recovery cycle over 3 years. *J Subst Abuse Treat*. 2005;28(Suppl 1):S63-72. DOI:10.1016/j.jsat.2004.09.006
24. Siegal HA, Li L, Rapp RC. Abstinence trajectories among treated crack cocaine users. *Addict Behav*. 2002;27(3):437-49. DOI:10.1016/S0306-4603(01)00184-8

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