Follow-Up Study of Crack Cocaine Users: Situation of the Patients After 2, 5, and 12 Years

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ABSTRACT. The purpose of this study was to follow-up 131 crack users and examine drug use, treatment experience, employment status, and mortality at 2, 5, and 12 years. Consecutive crack dependent patients were re-interviewed in 1995–1996, 1998–1999, and 2005–2006. Of those subjects not using cocaine at 2 years, 19 (63%) were still abstinent at 5 years. Almost half of the users were abstinent at the same period. The abstinent group was still the most prevalent at 12 years. Twenty-seven (20.6%) patients had died by the 12-year follow-up, with homicide being the most common cause (n = 16). After 2000, however, it declined sharply with only 2 deaths in 7 years. There was a progressive movement toward abstinence over the follow-up period, with the evidence that once abstinence had been achieved it was maintained. On the other hand, the mortality rate was extremely high and probably more related with socioeconomic factors instead of the drug use itself.

KEYWORDS. Crack cocaine, follow-up, mortality, treated patients

INTRODUCTION

Complications related to crack consumption represent a public health problem, especially in the Americas and Europe (1,2). Crack cocaine was brought to Brazil in the late 1980s (3,4) and reached the less economically favored people, particularly adolescents (4–6). During the next decade, crack consumption increased, and treatment services were sought by the majority of crack users (3). In addition, most individuals using cocaine via injection and inhalation have changed these original administration routes because of AIDS and crack's low price,

respectively (7). Although a small portion of the general population has been affected (8,9), overdose, criminality, and violence involving young individuals have transformed crack cocaine dependence into a public health problem of extreme importance (2).

Little is known about the natural history of crack consumption. Most longitudinal studies have investigated those outcomes related to the efficacy of therapeutic interventions (10–13). The existing data on mortality and cause of death are still inaccurate. For that reason, a 2-year follow-up study of 131 crack cocaine users who had been treated in São Paulo between 1992 and 1994 was carried out in October 1995 and December 1996 (14). A very high annual mortality rate, mainly caused by AIDS and homicides, was found. These findings encouraged us to go on following up the same subjects, but the mortality trend was found to be extremely high over the 5-year follow-up (15–17). In the face of the data obtained in the two previous follow-ups, a third one aiming to investigate the same sample over a period of 12 years has been carried out and will be finished soon. In addition to the extended follow-up period, the data collection procedures were also improved. Variables such as lifetime drug use (crack and other substances), changes in the administration route (cocaine), crack consumption, and high-risk sexual behavior were all included. Also, a complementary qualitative methodology was used in order to obtain different life histories of consumption/abstinence of crack cocaine.

METHODS

Subjects

The subjects who had been treated between May 1992 and December 1994 were initially identified via their admission registers available in the Alcohol and Drug Detoxification Unit of the Taipas General Hospital (TGH) and then consecutively selected according to specific diagnosis criterion for crack cocaine addiction (ICD-10). A total of 131 subjects were treated during that period and their diagnosis had been established by means of clinical interviews with psychiatrists responsible for their treatment.

The Taipas General Hospital (TGH)

The Taipas General Hospital is located in a northern district of São Paulo City and has a multidisciplinary unit for alcohol and drug detoxification. The program is sought by patients of all ages, and during the follow-up period, it was the only detoxification service for chemical dependents provided by a public institution in the whole city. The detoxification program lasts 2 weeks and is followed by outpatient referral.

Procedures

The procedures adopted by the present study were approved by the Committee of Ethics in Research of the Federal University of São Paulo (832/05). In the first follow-up study (1995–1996) (14) the contact with patients or relatives had occurred predominantly by telephone calls. The authors had also reviewed the patients' medical records in order to update any information on their previous personal situation and admission period. Those patients not found by using telephone calls (n = 44) had been sent telegrams indicating a practitioner to be contacted in the UNIAD. Patients who had been declared dead or not been found by their families were traced via official records so that death certification could be obtained. In the end, the whereabouts of 103 patients (78.6%) were known.

In the second follow-up study (1998–1999) (17), some additional strategies for locating patients had been adopted. As a result, those patients who could not be found by telephone calls or by telegrams were interviewed at their homes (n = 17). The investigators were also able to update any information by consulting the patient's neighbors (n = 31). An online telephone catalogue was helpful in looking for some patients (n = 5). Finally, a small group of patients who were thought to have disappeared were found by examining the Brazilian imprisonment system (n = 4). Such strategies helped in reducing the number of absent patients from 28 to 7 in comparison to the sample studied in the first follow-up, thus totaling

124 patients (94.6%). The third follow-up study (2005–2006) was based on a data review of the patients seen during the second follow-up. On-line telephone catalogue and medical records obtained from the Taipas General Hospital were used for updating this information so that a new contact with these same patients could be established.

One of the innovations provided by this third follow-up was that telephone calls were no longer used as the main form of contacting the patients, since home visits enabled high-quality interviews and consequently more accurate information. In addition, relatives of imprisoned, deceased, and disappeared patients were also interviewed (data on prior-year outcomes), which had not been possible before.

Telephone numbers and addresses not updated (n = 44) had to be actively sought by the investigators. If such information was not obtained, then the investigator had to walk around the neighborhood in order to obtain any information on the patient's whereabouts or his family. In this way, it was possible to find some relatives and/or patients, who were promptly interviewed (n = 13). The investigators had also used MSN and Orkut in an attempt to locate the missing patients. Two subjects were contacted, but no answer was obtained. Currently, the investigators are searching the prison system, and 102 patients (77%) have already been located.

Statistical Analysis

A descriptive analysis was used to summarize the patient profiles. The mean values were compared between the groups by using a t-test, whereas the categorical data were analyzed by using a chi-square test. The data were normally distributed. Mann-Whitney U test was used for analyzing the parametric data, despite the high biases.

For the second follow-up study, the gross mortality rate was obtained by dividing the number of deaths by the total number of individuals in the sample. The mean annual rate of mortality was calculated by dividing the gross mortality rate by the number of follow-up years. These values were expressed as number of deaths per 1000 individuals. This value was then adjusted according to gender and age by applying the respective indices to their distribution in São Paulo City (direct method) in order to eliminate any difference in the rates resulting from differences in both populations. Gender and age distribution for the inhabitants of São Paulo City and their expected mortality rates were obtained from records provided by the State of São Paulo Data Analysis System Foundation (SEADE). The excess mortality rate was calculated as being the difference between observed and expected mortality rates. The standardized mortality rate (SMR) was defined as being the ratio between both mortality rates. Survival analysis was carried out by using the Kaplan-Meier method. The analyses were performed by using the SPSS (Statistical Package for Social Scientists) program for Windows, version 8.0.1.

RESULTS

Data Collection and Forms of Contacting the Patients

Data collection had its duration significantly reduced in the second follow-up study in comparison to the third one: from approximately 24 months to 17 months.

While the two first follow-up studies had predominantly contacted the patients by means of telephone calls (n = 102, 99%; and n = 88, 79.3%, respectively), the third follow-up has largely involved home visits (n = 66, 66%). Regarding the data sources, the two first follow-ups had relied upon interviews with the patients' relatives (n = 80, 77.6%; and n = 65, 58.6%, respectively), whereas the third follow-up has been mostly obtained information by interviewing the patients (n = 42, 64%). Such an approach allowed achieving more detailed and accurate information as well as referrals for treatment whenever needed. Data for those patients known to be dead, imprisoned, or disappeared (n = 37) were not included here.

Detoxification

In general, the patients who have been hospitalized were young, single, and of low

TABLE 1. Sociodemographic Details of 131 Crack-Dependent Patients at the Time of Admission to a Detoxification Unit Between 1992 and 1994

Variables*	N	%
Gender (n = 131)		
Male	116	88.5
Female	15	11.5
Age (years) (n = 131)		
10–14	3	2.3
15–19	35	26.7
20–24	48	36.6
25–29	20	15.3
30–34	12	9.2
35–40	8	6.1
40–45	5	3.8
Race (n = 130)		
White	97	74.6
Black	33	25.4
Civil status (n = 130)		
Single	87	66.9
Married	35	26.9
Divorced	8	6.2
Schooling (n = 102)		
Less than 8 years	57	55.9
8 Years or more	45	44.1
Employed/studying (n = 124)		
Yes	38	30.6
No	86	69.4
Committed an offense (n = 123)		
Yes	61	49.6
No	62	50.6
Imprisoned (n = 123)		
Yes	26	21.1
No	97	78.9

Note: *Missing data for some variables are due to the absence of this information in the case notes.

educational level. Most of them were unemployed as well. The demographic details of the sample are outlined in Table 1. The mean onset age of using crack cocaine was 22.6 years (SD = 6.93, range 12–42 years). Two thirds of the patients had used crack for the first time before the age of 18.

Nevertheless, crack cocaine was not the first drug among the majority of the users (n = 119, 99.2%), who reported that cocaine (n = 99, 83.2%) and marijuana (n = 81, 68.1%) had already been consumed earlier. Intravenous injection of cocaine was reported by almost one third of the patients (n = 35, 28.7%) before seeking the Taipas General Hospital.

Two-Year Follow-Up

The first follow-up study located 103 patients (78.6%). Among them, 50 (38.2%) had consumed crack cocaine during the prior year, 29 (22.1%) were abstinent during the same period, 9 (6.9%) were imprisoned, 2 (1.5%) had disappeared, and 13 (9.9%) had died.

Little more than 15% (n = 12) of the crack users attended schools and 70.9% (n = 56) were employed. Most of them (n = 46, 58.2%) have sought some type of treatment after being discharged, for hospitalization is the most frequently used treatment modality (n = 26, 56.5%), followed by outpatient interventions (n = 16, 34.8%).

The high annual mortality rate (38 deaths per 1000 inhabitants) was an important issue raised in the present study, as 11% of the sample had died (n = 13). Regarding the causes of death, most of the patients were killed by firearms (n = 07, 53.84%), and AIDS (n = 5, 38.46%) and overdose (n = 1, 7.69%) accounted for the remaining deaths.

Five-Year Follow-Up

In the second follow-up study, the changes in consumption and abstinence were compared to those observed in the prior follow-up: 5 years after the hospital discharge, the majority of patients (n = 52, 39.7%) were individuals who had not used crack cocaine during the prior year. Among the abstinent patients studied in the first follow-up (n = 29), 63% of them remained as such (n = 18) after 5 years, whereas 46% of the crack users (n = 50) were also found to be abstinent (n = 23). Therefore, the user group was reduced to 28 individuals (21.4%). Regarding the remaining patients, 16 (12.2%) were imprisoned (robbery and drug traffic as main causes), 5 (3.8%) had disappeared, and 10 were dead, thus increasing the number of deaths to 23 (17.6%).

On the other hand, either inpatient or outpatient treatment had been sought by a similar number of patients (n = 56, 52.3%), mainly when they relapsed.

Regarding the employment situation, more than two thirds of the sample were regularly working (n = 56, 70%) either in formal

FIGURE 1. Survival curve of a sample of 126 crack-dependent patients followed up over 5 years in São Paulo, Brazil. The number of patients at risk from the beginning of each interval was 126, 120, 111, 107, 86, and 39, respectively. The survival chance each year was 0.95 (95% CI 0.91–0.99); 0.90 (95% CI 0.84–0.94); 0.87 (95% CI 0.81–0.93); 0.84 (95% CI 0.77–0.91), and 0.80 (95% CI 0.72–0.87).
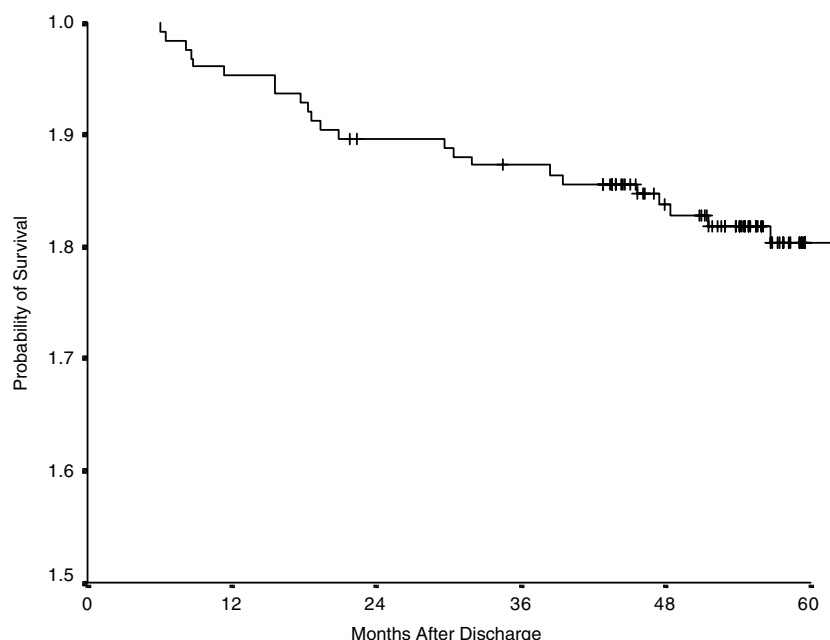
occupations (n = 24, 42.8%) or full-time work (n = 49, 87.5%) during the prior 12 months. No differences in the occupational level were found between crack users and abstinent patients. The low educational level was similar to that observed in the first follow-up, since a small portion of the sample (n = 11, 13.7%) had been studying during the same period.

Mortality in the Second Follow-Up

A gross mortality rate of 35.1 deaths per 1000 inhabitants was observed. The annual adjusted mortality rate for the sample (gender and age adjusted to the São Paulo City population by using a direct method) was of 24.9 deaths per 1000 individuals. The expected mortality rate for the São Paulo City population was of 3.3 deaths per 1000 inhabitants. Therefore, the excess morality rate and the standardized mortality rate (SMR) were, respectively, of 21.6 and 7.6 deaths per 1000 inhabitants. A survival analysis showed that the 5-year survival probability following the

treatment was of 0.80 (95% CI = 0.77 to 0.84; see Figure 1); that is, 20% of the sample were at risk of death at the end of the 5-year period.

The majority of the patients had died due to external causes (n = 16, 69.5%), predominantly homicides (n = 13, 56.5%); only 2 deaths involved overdose (8.7%) and one involved drowning (4.3%). All natural deaths (n = 7, 30.4%) were related to sexually communicable diseases such as AIDS (n = 6, 26.1%) and hepatitis B (n = 1, 4.3%).

12-Year Follow-Up

The third follow-up study has now reached the final stage of data collection. As there are few patients to be located in the Brazilian prison system—and those successfully traced will not be interviewed at all—the authors decided to divulge the preliminary results found in the present follow-up.

A total of 102 patients (77%) have been located up to now. The abstinence tendency

TABLE 2. Situation of Crack Consumption Among Patients During Follow-Ups

Follow-Up	Abstinent	User	Unkown*	Dead
2-Year	29	50	39	13
5-Year	52	28	28	23
12-Year	43	22	39	27

Note: *Including individuals not located at the follow-up or in prison.

(n = 43, 32%) was found to be similar in relation to the second follow-up, to the detriment of crack consumption (n = 22, 17%). Regarding the other outcomes, 2 missing patients (1.98%) and 4 new deaths had to be computed (n = 27, 20.6%). Eight patients (7.92%) are known to be in prison, which may raise such an index. Nevertheless, in the present study we were not able to locate—until now—29 patients (29%). The patient situation in the 3 follow-up studies is listed in Table 2.

Of the 4 deaths found in the present follow-up, 2 (homicides) had already occurred during the previous follow-ups and were not detected on that occasion. The other 2 deaths (homicide and overdose) occurred in 2002 and 2003, and thus were considered new cases.

Mortality Evolution Over the Follow-Up Years

Two significant increases in the mortality rate (peak) were observed during the first follow-up (1995) and at the beginning of the second follow-up (1996–1997; Figure 2). After such a period, however, a decline was seen and since then the mortality rate has been stable. A new survival analysis will be carried out at the end of the data collection.

DISCUSSION

The present study is aimed at further improving the previous search methods. In order to do so, the majority of the patients/relatives were personally interviewed. In order to locate the missing patients, not only the neighborhood was consulted but also the members of the community in which the patient lived. For example, the mother of a patient was found by consulting the local hairdresser, who used to keep a list of former clients. This delineates the importance given to the strategies used by the present study in locating missing patients. Other search instruments such as Microsoft Messenger (MSN®) and Orkut (Google®) have been employed for contacting other 2 patients, but unfortunately they did not return any E-mail.

In comparison to the first 2 follow-up studies, there was an increase in the number of unlocated patients (n = 29), although the official records regarding imprisonment were not computed. It should also be noted that some patients had moved to other residences, cities, or even states during the follow-up interval (according to their neighbors). Up to now, 102 individuals have been located (77.1%). Harocopos et al. (18) have pointed out that these individuals are not likely to be found because of the long interval between follow-ups and their life profiles, particularly when one considers the economically low and unstable patterns of life in which they are inserted, which usually forces them to move from one place to another.

We have observed that 63% of the patients who were found to be abstinent in the first follow-up (2 years) managed to keep such a condition (5 years). In addition, almost half of the crack users in the first follow-up stopped using crack in the second follow-up. This tendency is corroborated by the third follow-up study, as the majority of the sample was found to be abstinent after 12 years. Also, Falck et al. (19) followed up 439 untreated crack users who had no criminal history and no housing problems and they found that the proportion of patients using crack cocaine more than once a day was 50% lower after 2 years of follow-up. Brain et al. (20), in a 6-month follow-up study, observed an oscillation in crack use in terms of frequency and quantity. However, 25% of the sample had stopped using crack cocaine, although only 10% were not using any other psychoactive substance. In 2002 and 2003, Hser et al. (21) interviewed 266 veterans who had been consecutively admitted for treatment of cocaine dependence between 1988 and 1989 (12-year follow-up). The authors observed an increased index of relapse in the first 2 years of follow-up, which was followed by stabilization well below the baseline index.

FIGURE 2. Mortality evolution over 12 years. Lozenge lines show absolute death rates per year (with two peaks during the first and second follow-ups). Square lines show cumulative mortality rate evolution per year (with very high rate after 12 years).
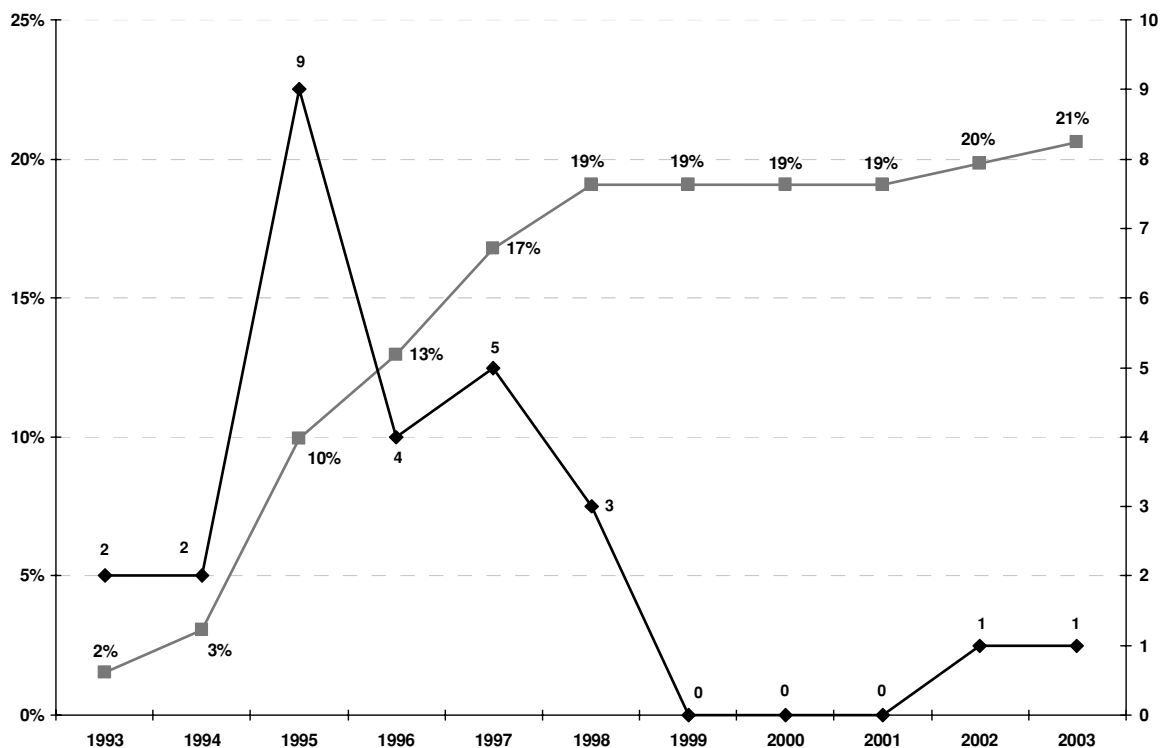
After 12 years, more than half of the sample (51.9%) was found to be abstinent for more than 5 years. The probability of abstinence was directly related to the number of treatment months per year, thus suggesting that these drug users exhibit significant improvement and benefit from such programs when they adhere to them.

In the second follow-up, it was observed that a gradual increase of the results related to bad prognosis, particularly the mortality. During this period, the mortality rate was 8-fold greater than that of the general population (SMR = 7.6). Homicides were the main cause of death, accounting for 56% of all deaths observed. In 1988, Budd (22) evaluated the first 114 deaths in Los Angeles in which the plasma levels of cocaine were high. The author observed that 43.8% of the cases involved homicide (n = 50), that is, 26.3% had been killed by firearm (n = 32), 15.8% were killed with another type of weapon (n = 18), and 1.7% by strangulation (n = 2). Although the present study allows no suppositions to be made

about the etiology and the meaning of the homicide prevalence among such patients, the high mortality rates during the 5 years of follow-up (1992/1994 to 1998/1999) coincided with the arrival of crack cocaine in São Paulo City (3,4,6), which resulted in extreme violence among those individuals marketing such a drug. Indeed, some studies have related the homicide rise to the expanding crack cocaine market, which recruits socially excluded youths and relies on the firearm largely available in the economically poor regions (23,24).

The third follow-up study, however, has detected a reduction in such a tendency. The mortality rate, which was found to be high in the first follow-up (12.6%) and significantly increased in the second follow-up, is stabilized (20.6%) according to the present study; that is, between 1999 and 2006 there were only 2 cases in comparison to the 25 deaths observed between 1993 and 1998. Although, this rate of 20%—after 12 years of being discharged from

HGT—when compared to other follow-ups, with the same substance; showed a considerable high increase: Hser et al. (21) have found a mortality rate of 8.7% in their 12-year follow-up study. Likewise, Murphy et al. (25) carried out a long-term follow-up (11 years) of a group of 21 middle-class friends who had higher school and were sociable, and they found a similar mortality rate (8%). Therefore, both studies have pointed out that educational background, socio-economical level, and social and affective support are protective factors with very distinct characteristics from the present sample.

In relation to the stabilization of mortality rates after 12 years, some studies emphasize that socio-economical factors are involved in reducing this process: in the United States, during the mid-1990s, the number of homicides among this population were significantly reduced as the socio-economical indexes and the crack cocaine market began to stabilize (24). In Brazil, the Brazilian Institute of Geography and Statistics (IBGE) reported that homicides among youth in the State of São Paulo had decreased by 43% between 2001 and 2005 (26). According to Brazilian specialists, economic improvement, campaign for disarmament (150,000 firearms had been handed over between 2004 and 2005), public security operations by the government, social activism, and accommodation on the illegal drug market were all responsible for such a fall (27).

In principle, it seems that combining adequate and effective treatment programs with public policies promoting social inclusion can be the best approach for this population.

STUDY LIMITATIONS

As the sample served the purposes of our study, the data replication is restricted. It's important to note the reduced number of women which took part in the sample. Furthermore, the numbers of nonlocated patients increased in the third follow-up, although this fact did not compromise the validation of the data. Finally, in order to further understand the cessation strategies and consumption maintenance during this 12-year follow-up period after hospital discharge, we expect to carry out a qualitative investigation.

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