Causes of death among crack cocaine users

Causa mortis em usuários de crack.

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Resumo

Objetivos: O estudo acompanhou por cinco anos um grupo de 131 usuários de *crack* e observou os padrões de mortalidade, bem como as *causas mortis* entre esses. **Material e método**: Todas os indivíduos que se internaram em um serviço de desintoxicação, localizado no município de São Paulo, entre 1992 – 1994 foram entrevistados em duas ocasiões: 1995-1996 and 1998-1999. **Resultados**: Após 5 anos, 124 pacientes foram localizados (95%). Vinte e três pacientes (17,6%) haviam morrido ao final do quinto ano de seguimento, sendo os homicídios por arma de fogo ou arma branca, a causa de homicício mais comum (n=13). Quase um terço dos pacientes morreu devido à infecção pelo vírus da imunodeficiência adquirida (HIV), especialmente aqueles com antecedentes pessoais de uso de drogas endovenosas. Menos de 10% dos pacientes morreu de *overdose*. **Conclusões**: O estudo sugere que os usuários crack têm maior risco de morte do que a população geral, sendo os homicídios e a AIDS as causas mais observadas. Desse modo, além do acesso ao tratamento, ações de saúde pública para esses indivíduos devem incluir medidas específicas capazes de prevenir ou reduzir tais desfechos.

Descritores: cocaína *crack*, estudos longitudinais, mortalidade, causa da morte

Abstract

Objectives: To monitor crack-cocaine users over a 5-year period and examine mortality patterns and causes of death. **Methods**: A group of 131 consecutive crack-dependent patients admitted to a detoxification unit in Sao Paulo between 1992 and 1994 were interviewed during two follow-up periods: 1995-1996 and 1998-1999. **Results**: Due to sample losses, the final data set consisted of 124 patients. By the study endpoint (1999), 23 patients (17.6%) had died. Homicide was the most common cause of death, followed by AIDS, especially among those with a history of intravenous drug use. Less than 10% died from overdose. **Conclusions**: Our results suggest that the mortality risk among crack cocaine users is greater than that seen in the general population, homicide and AIDS being the most common causes of death among such individuals. Therefore, in addition to treatment, public health interventions aimed at this population should include specific measures designed to minimize or prevent such outcomes.

Keywords: Crack Cocaine; Longitudinal Studies; Mortality; Cause of Death

Introduction

Substance misuse has always been associated with risk of mortality among their users[1]. In addition, patterns of drug use have undergone considerable modifications in the last 30 years. Such modifications include the dissemination of injection heroin in Europe and in the USA, as well as the advent of synthetic drugs (designer drugs) and crack cocaine throughout the western world[2,3]. Such changes have altered the composition of mortality profiles related to drug use, especially among adolescents and young adults[4,5]. In this population, there has been a reduction in the proportion of deaths from natural causes (cardiopathy, neoplasia, and infectious diseases - excluding STDs and AIDS), at the expense of an increase in the percentage of deaths from external causes (overdoses, accidents, suicides, and homicides)[5,6].

As a member of this "new generation" of psychoactive substances, crack cocaine has caught the attention of health authorities, especially in the Americas and in Europe[3,7]. Despite affecting a minority of the population[8,9], the profile of young crack users, the acute effects, and the violence of the illegal market have transformed crack into a public health issue of extreme importance[3].

Crack first appeared in Brazil in the late 1980s[10,11], and crack use began to increase rapidly in the following years due to the lower price and more intense effects of the drug.[12] Injection drug users (IDUs), motivated by the fear of AIDS, also altered the route of administration from injection to crack smoking[13]. Sociodemographic profiles show this group of users to be comprised primarily of single, unemployed males from 15 to 30 years of age and presenting low levels of education and income[11-14]. Homeless young males are especially

affected by crack use, and rates of recent crack abuse range from 15 to 26% among such users[15]. In addition, crack users tend to engage in risky sexual activities and drug dealing more frequently than do inhaled cocaine users[16,17].

Very little is known of the natural history of crack use. In most of the longitudinal studies conducted, researchers have typically been more interested in investigating treatment outcomes[18-21]. Data regarding crack-related mortality and its causes are even more imprecise despite the fact that crack use is a recent phenomenon and is influenced by innumerable variables. In view of this, Laranjeira et al. [22] carried out a 2-year follow-up study from October 1995 to December 1996 comprising 131 crack user patients who had been hospitalised in São Paulo from 1992 to 1994. The authors reported a very high annual mortality rate, most of the deaths being caused by AIDS or homicide.

These findings motivated us to continue to monitor these patients, extending the follow-up period to a total of 5 years. A survival analysis of this sample has been published previously[23], and the present study focuses more on providing additional information on mortality rates and the causes of death, comparing the data obtained to those related to users of other substances, as well as compiling evidence from the literature on the theme.

Methods

Subjects

Subjects were selected from among the patients admitted to the Alcohol and Drugs Detoxification Unit of the *Hospital Geral de Taipas* (HGT, Taipas General Hospital) from May 26, 1992 (the first day of operation for the unit) to the December 31, 1994. Those meeting the criteria established by the International

Classification of Diseases (ICD-10) for crack dependence were included in the study. In total, 131 patients were admitted to the clinic during this period. Diagnosis was established through a clinical interview with the psychiatrists responsible for hospitalisations.

General Hospital of Taipas

The HGT is located in a suburban neighbourhood in the northern part of the city of São Paulo. The Alcohol and Drugs Detoxification Unit is a multidisciplinary facility. The facility receives patients from all over the city and specialises in the detoxification of chemical dependents. At the time of this study, it was the only public clinic of its type in the city. The detoxification programme lasts two weeks and is followed by outpatient care.

Procedures

Data collection was carried out through a structured interview and through the review of medical files. The interviews were used in order to gather information on the evolution of participants after being discharged from the HGT and included questions regarding topics such as their present pattern of crack use, employment status, legal problems, and search for treatment. The review of patient files was aimed at the compilation of demographic data of patients at the time of their hospitalisation. Both procedures were carried out by the principal author (MR) and by the assistant occupational therapist of the HGT Detoxification Clinic, who had been pretrained for this purpose.

The first follow-up evaluation period was from 1995 to 1996 – on average, 2 years after the initial admission[22]. Interviews were carried out over the telephone if possible. When that was not possible, a registered letter was sent to the last known address of the patient in question. If no response was received, a second registered letter was sent. Finally, records obtained from the municipal *Programa de Aprimoramento das Informações de Mortalidade* (PRO-AIM, Programme for the Improvement of Mortality Data) were reviewed in order to confirm the deaths of subjects reported by their families, as well as to investigate the incidence of mortality of those patients for whom current information was unavailable.

The second follow-up study was carried out from 1998 and 1999. The same procedures were used, together with additional strategies for locating subjects. During the first follow-up period, 13 patients died. Therefore, their families were not contacted again. Initially, 51 patients were interviewed over the phone, and 3 others were located by registered letter. Those who did not respond to the second registered letter were visited at their homes. In this fashion, we succeeded in interviewing 17 patients and updating the telephone numbers of another 31. Using the internet telephone directory for the city of São Paulo, an additional 5 patients (or their parents) were located. By the end of this process, 11 patients remained unaccounted for. A tracking search was then carried out, involving the Centre for Psychiatric Hospitalisation Openings of the State of São Paulo Health Department (no patients located), PRO-AIM (no patients located), and the Secretary of Penitentiary Administration (4 patients located). Such additional strategies helped decrease the number of patients unaccounted for from 28 (in the 1995-1996 period) to 7 (in the 1998-1999 period).

Statistical Analysis

A descriptive analysis summarised the profile of the patients under study. The overall mortality rate was obtained by dividing the number of deaths by the total number of individuals in the sample. Mean annual mortality was calculated by dividing the overall mortality rate by the number of years of follow-up study. The mortality rate adjusted for gender and age was obtained by means of the direct method, using the population of the city of São Paulo in 1996 (the mean of the study period) as the standard. Gender and age distribution in the population of São Paulo, and the predicted mortality rates in the area were obtained from SEADE Foundation data. The excess mortality rate was calculated by determining the difference between the observed and predicted mortality rates. The standardised mortality ratio was defined as the ratio between the observed mortality rate and the predicted mortality rate.

Results

Sociodemographic profile

From May 1992 to December 1994, 131 crack users were hospitalised in the HGT. A total of 65 patients (50%) resided in the northern area of the city, primarily in the immediate vicinity of the HGT, whereas 20 (15.3%) resided in the eastern part of the city, 16 (12.2%) in the western part, 15 (11.5%) in the southern part, and 7 (5.3%) in the central part. There were 7 (5.3%) who lived on the outskirts of the city and 1 (0.8%) who lived in the surrounding countryside (in the city of São Roque). Among those living in the city of São Paulo, 13 (11%) resided in neighbourhoods presenting the best socioeconomic

and environmental conditions, whereas 110 (89%) resided in neighbourhoods considered intermediate or poor in terms of socioeconomic conditions and overcrowding[24].

The majority of the sample was composed of single Caucasian males, possessing low levels of education. Most were unemployed or were school dropouts. The mean age was 23.6 years (± 6.7 years), and 86 (66%) of the patients were younger than 25. A total of 61 patients had had some sort of legal problems, and 26 had been arrested at least once. Table 1 shows the demographic data for the study sample.

Mortality

A total of 23 patients (17.6%) died between discharge and the beginning of the second follow-up period. Mean age at death was 27.1 years (SD = 6.60 years; range, 18-40 years). Approximately 48% of the patients who died did so before the age of 25. Table 2 shows the mortality profile.

Overall annual mortality in the study sample was 35.1 deaths per 1000 individuals. Annual mortality adjusted for age and gender (direct method), using the population in the city of São Paulo as a standard, was 24.9 deaths per 1000 individuals. The predicted mortality rate for the population of the city of São Paulo was 3.3 deaths per 1000 inhabitants in 1996, which was the midpoint of the study period. Therefore, the excess mortality rate was 21.6 deaths per 1000 individuals, and the standardised mortality ratio, in relation to that predicted for the city of São Paulo, was 7.6.

Causes of death

Table 3 provides data regarding the causes of death. External causes were responsible for 16 (69.6%) of the 23 deaths that occurred. There were 2 patients who died from overdose (8.7%) and 1 who drowned (4.3%). Of the 23 deaths, 13 were attributed to homicide. Based on the cause of death categories established in the ICD-9/ICD-10 and provided by PRO-AIM, 10 patients (43.6%) died from gunshot wounds, and 3 (12.7%) died from wounds inflicted by other weapons. According to reports made by the families of patients, the murders were related to disputes between gangs, debts owed to drug dealers, and confrontations with the police.

There were 7 patients (30.4%) who died of natural causes, 6 (26.1%) who died due to AIDS, and 1 (4.3%) who died from hepatitis B infection.

Consequently, the incidence of mortality due to external causes was high, and violent death predominated (56.6% of the deaths reported). Of the 23 deaths, 6 (26.1%) were attributed to AIDS, whereas mortality exclusively due to cocaine pharmacology was responsible for only 2 (8.7%) of the deaths reported among the crack users evaluated in this study.

Discussion

Mortality among crack users hospitalised in the HGT (1992-1994) was high, more than seven times greater than that seen among the general population of the city of São Paulo for the same period. Most of the patients who died were single males below the age of 30.

Overdose

In the present study, only 2 patients (8.7%) died of overdose. Although non-fatal overdose is common[25], indirect evidence found in the literature has shown that crack cocaine has a low lethal potential, especially when compared to drugs such as opiates (Table 4). Epidemiologic surveys of overdose cases carried out in various countries[26-31] have demonstrated mortality rates attributed exclusively to cocaine ranging from 2% to 7%. In addition, cocaine overdose seems to be more common among individuals suffering from cardiovascular problems[32] and among those who combine its use with that of other substances, whether through intravenous injection[33] or through other routes of administration[34].

In contrast, according to the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA)[2], the available statistics on the number of cocaine-related deaths are likely to contain inaccuracies. First, there are methodological differences in the way data is collected in the various countries. Second, post-mortem tests to detect the presence of cocaine are rarely performed if heroin is first detected. Finally, the presence of and role played by cocaine in “natural” causes of death, especially cardiovascular diseases, can go uninvestigated in the forensic evaluation.

AIDS

In the present study, AIDS was responsible for one-fourth of the deaths occurring among the crack users evaluated. This prevalence probably reflects the phenomenon of the shift to different routes of administration that occurred after the appearance of HIV[13] since only those who had reported intravenous drug use died of AIDS. In addition, the HGT hospitalisation period (1992-1994)

coincided with the arrival of crack and the expansion of its use in the city of São Paulo[10-12].

According to data from the previously published follow-up study conducted by Ribeiro et al.[23], intravenous drug use prior to hospitalisation is clearly correlated with reduced survival among crack users. The authors found 5-year survival among crack users with a history of injection drug use to be 63%, compared with 86% among crack users with no such history ($p = 0.004$). In addition, the mortality risk was 3.5-times higher than that seen among those never having used injection drugs. These findings are in agreement with those of other follow-up studies of injection drug users: Frischer et al.[35] conducted a 14-year study involving 459 injection drug users treated at an outpatient in Scotland. At the end of the follow-up period, the survival rate for HIV-positive injection drug users was less than 50%, whereas it was approximately 90% for those who were HIV negative.

Due to the sexual behaviour of crack users, crack use has also been directly correlated with HIV infection[16,17]. The most frequent risky behaviours in this population are having a high number of sexual partners and engaging in unprotected sex, usually motivated by the need to acquire the substance [36,37]. In the present study, we did not investigate such risky behaviour. Therefore, prior use of intravenous drugs was considered the main cause for HIV infection among these users. In future follow-up studies of the same patients, sexual behaviour will be investigated in detail.

Homicides

More than half of the deaths (56,6%) among crack users in the present study were homicides, and gun-related deaths predominated. Two cross-sectional studies obtained similar results: Budd[38] evaluated the first 114 deaths testing positive for plasma levels of cocaine in the city of Los Angeles in 1988. The author reported that, of the 50 individuals (43.8%) who were homicide victims, 32 (26.3%) were killed with a firearm, 18 (15.8%) were killed with another type of weapon, and 2 (1.7%) were strangled. In another cross-sectional study, Marzuk et al.[39] compiled all the deaths due to external causes in New York City from 1990 to 1992, evaluating a total of 14,843 deaths. Cocaine was detected in 26% of the deaths. One-third of those were due to intoxication (cocaine alone or in combination with other drugs), whereas the other two-thirds were attributed to homicides, suicides or accidents. Despite the high rates of mortality due to violent deaths, we should highlight the fact that the methodology used in both studies presented relevant limitations. For example, it is not possible to detect the chronic use of the substance in abstinent individuals dying from cardiopathies, AIDS, etc. Neither is it possible to determine the impact or actual contribution of cocaine to any given death. The proportion of deaths due to external causes might therefore have been overestimated.

Most follow-up studies that have examined mortality among drug users have been with heroin users[18,35,40-51], subjects using a broad range of substances[52-55], or prescribed drugs[56,57]. In all of those, the highest mortality rate due to homicide found was 5% of the deaths reported (Table 4). Even in those studies in which homicides, suicides, and fatal accidents were combined under the headings of “violent deaths” or “other external causes”, such mortality did not exceed 20% of the deaths reported[18,35,40,51]. Only the study by Goldstein et al.[43]

showed a higher rate of mortality due to homicide: 17% of the deaths among heroin users in their sample. However, their sample was composed exclusively of young Hispanic males residing in the state of New Mexico and involved with drug dealing.

Although the results of the present follow-up study do not allow assumptions to be made regarding the aetiology and significance of the high prevalence of homicide among its drug user sample, the findings of the other studies presented below could be of great value in forming a basis for future investigations.

According to the World Health Organization[58], homicide rates among young males from 10 to 30 years of age increased significantly from 1985 to 1994. Although this was a worldwide increase, it was more accentuated in large urban centres in developing countries. Such homicides appear to be directly related to socioeconomic factors (poverty and social exclusion)[58-60] , to gang battling for drug market control[61], as well as to the facilitated access to firearms observed in countries such as the USA and Brazil[62].

The illicit crack market seemed to have played an important role in this scenario. Its appearance and expansion in the mid 1980s in the USA[63] and in the early 1990s in Brazil[12] has been considered by various authors to be a significant cause of homicide among the young[61,64-66]. Goldstein et al.[65] studied a sample of 218 police reports of homicides from four police districts in New York and stated that 162 (74%) of those homicides were caused by territorial disputes among drug-dealing gangs, 31 (14%) were related to the psychological effects of crack, and 8 (4%) were due to misdemeanours committed because of drug use (more than one cause was present in 8% of the cases). In the USA,

the knowledge that crack use fomented violence caused the crack market to retract in the early 1990s. This was followed by a significant decrease in the number of homicides among the population initially targeted[61,67].

In Brazil, the incidence of homicides began to increase in the mid 1970s[68] , and the rate of increase accelerated in the 1980s[69]. Currently, homicide is responsible for more than one-third of all deaths due to external causes[70]. Such increases have been confirmed in the principal Brazilian capitals[68,69.71,72]. In the city of São Paulo, there was an increase of approximately 400% during the last 30 years[73-75].

In agreement with the global trend, homicide victims in Brazilian states are predominantly males from 15 to 35 years[76], and homicide rates seem to be directly related to socioeconomic indicators[77-84]. Therefore, homicides were more prevalent in marginalised, socially excluded suburban neighbourhoods. Likewise, Dunn et al.[85] found that theft, as well as assault with firearms, was higher among individuals treated in public clinics than among those treated in private clinics.

Gunshot has been shown to be the most prevalent form of homicide in all Brazilian capitals[68,69,86]. According to Peres & Santos[87], firearms were responsible for more than 50% of homicides in the 1990s and for approximately 70% in 2000 (an increase of 72% in this decade). In some areas of the city of São Paulo, firearms are responsible for up to 90% of homicides[73].

Finally, underserved neighbourhoods in large Brazilian urban centres are traditionally exploited by drug trafficking, which interferes with their function in various ways. Beato-Filho et al.[88] mapped the incidence of homicides in the city of Belo Horizonte from 1995 to 1999. The authors reported finding the highest

indices in neighbourhoods and slums where the trafficking of drugs, crack in particular, was prevalent. Santos et al.[80] used a similar methodology in order to study homicide distribution in the city of Porto Alegre. The authors found that areas in which homicide rates were higher were distinguished from others by their high population density and poor socioeconomic conditions, housing the largest slums in the city, which are commanded by drug gangs that battle each other for control of the illicit drug markets in those places. Similar panoramas have been described in other Brazilian capitals[71,73,77,78,83].

In such contexts, violence appears to be the principal means of solving market disputes, establishing and enforcing rules regarding the way members in those communities interact, and protecting gang members from other drug dealers or from police interventions. Homicide, therefore, achieves the status of law as a means of dealing with informers, deadbeat customers, and drug dealing competition[90,91]. Regarding the causes of homicides within these environments, data are scarce and controversial, indicating that the main motivations are matters related to drug trafficking, such as disputes between gangs for the illegal drug market, unpaid debts, and confrontations with the police[75,76].

As mentioned before, the present study provides no evidence that would allow conclusions to be drawn regarding whether the profile of the sample or the outcomes observed are causes or effects of the previously mentioned panoramas related to the transition from one route of administration to another and to the homicides. However, the determination of causal relationships is extremely important for the development of effective interventions for these patients. Everything seems to indicate that these interventions should be carried out not only at the individual and interpersonal level but also at the community

and social level. In addition, such interventions should be organised within and coordinated with a public policy strategy aimed at promoting health and social inclusion.

Future investigations

In order to better understand these potential relationships, a 10-year follow-up study is in its initial phase (the instruments are being pre-applied in a pilot study). In order to improve the quality of the data collected, patients will be interviewed in person. Family members will be interviewed only when patients are incarcerated or deceased. In either case, sociodemographic data and drug use histories will be examined in detail in order to identify prognostic indicators. In addition to amplifying and improving the structured interview to be used in the second follow-up study, a qualitative study will be used to investigate the dynamics of drug use and abstinence, taking drug use, as well as, more importantly, the influence of cultural, social and economic aspects, into consideration.

Limitations of the study

The present study comprised a group of crack users in only one clinic. Therefore, these results cannot be extrapolated to the general population of drug users. However, the verification of data, achieved through cross-checking patient records against those of PRO-AIM, guaranteed the reliability of the information regarding the causes of death. Finally, sample loss, an important

limiting factor of longitudinal studies, was minimal (5.3%; n = 7) and did not compromise the validity of the findings.

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Table 1. Sociodemographic characteristics of 131 crack users hospitalised in the *Hospital Geral de Taipas* (HGT, Taipas General Hospital) from 1992 to 1994.

Variables	**N**	**%**
Gender:		
(n = 131)		
Male	116	88.5
Female	15	11.5
Age:		
(n = 131)		
10 – 14 years	3	2.3
15 – 19 years	35	26.7
20 – 24 years	48	36.6
25 – 29 years	20	15.3
30 – 34 years	12	9.2
35 – 40 years	8	6.1
40 – 45 years	5	3.8
Race:		
(n = 130*)		
Caucasian	97	74.6
Black	33	25.4
Marital status:		
(n = 130*)		
Single	87	66.9
Married /steady partner	35	26.9
Divorced	8	6.2
Schooling:		
(n = 102*)		
Less than 8 school years	57	55.9
More than 8 school years	45	44.1
Employed/Enrolled in school		
(n = 124*)		
Yes	38	30.6
No	86	69.4
Convicted of a crime after discharge		
(n = 123*)		
Yes	61	49.6
No	62	50.6
Arrested after being discharged		
(n = 123*)		
Yes	26	21.1
No	97	78.9

* Some medical files did not include all data on the selected variables.

Table 2**. Characteristics of the 23 crack users who died between discharge (during the 1992-1994 study) from** the *Hospital Geral de Taipas* (HGT, Taipas General Hospital) **and the second follow-up study (1998-1999).**

	N	%
Gender		
male	22	95.7
female	1	4.3
Race		
Caucasian	16	69.6
Black	7	30.4
Marital status at time of hospitalisation		
single	15	65.3
married/in a steady relationship	6	26.0
Separated/divorced	2	8.7
Age at death		
15 – 20 years	5	21.8
21 - 25 years	6	26.1
26 - 30 years	6	26.1
31 - 35 years	3	13.0
36 - 40 years	3	13.0

Table 3**. Causes of death of 23 crack users who died between discharge from HGT (1992-1994) and the second follow-up study (1998-1999).**

Cause of death	N	%
Unnatural death	16	69.6
Homicide (firearms)	10	43.6
Homicide (other weapons)	3	13.0
Overdose	2	8.7
Drowning	1	4.3
Natural death	7	30.4
AIDS	6	26.1
Hepatitis B	1	4.3

TABLE 4: Main causes of death reported in longitudinal studies involving psychoactive substance users over the last 20 years, organised by drug type and by the initial year of follow-up.

Author (year of publication)	Follow-up period	Cause of death (%)					
		accidental overdose	homicide	suicide	other external causes	AIDS	other natural causes
COCAINE							
Budd et al.(*) [38]	1988–1988	28.1	43.8	§	17.5	#	10.5
Marzuk et al.(*) [39]	1990–1992	33.3	§	§	66.7	-	-
Ribeiro et al.[23]	1992–1999	8.7	56.5	-	4.3	26.1	4.3
OPIATES							
Hser et al. [40]	1964–1997	21.6	§	§	19.5	1.1	38.6
Wille R.[41]	1969–1979	42.1	-	§	31.6	#	26.3
Oppenheimer et al.[42]	1969–1991	43.9	2.4	4.9	31.7	#	17.1
Goldstein et al.[43]	1969–1991	35.0	17.0	3.0	29.0	#	6.0
Bargagli et al.[44]	1980–1997	42.1				24.8	
Fugelstad et al.[45]	1981–1992	64.2	1.8	14.2	9.8	3.7	6.3
Frischer et al.[35]	1982–1994	43.4	§	1.9	15.3	11.3	28.3
Sánchez-Carbonell [46]	1985–1995	31.7	-	§	-	51.2	17.1
Chen et al. [47]	1985–1996	34.0	5.0	7.0	-	-	54.0
Quaglio et al.[48]	1985–1998	36.9	1.2	5.5	20.4	32.5	3.5
Zanis et al. [49]	1993–1994	66.6	-	-	-	-	33.4
Gossop et al.[18]	1885–1999	68.0	§	§	14.0	#	18.0
Roy et al.[50]	1995–2000	30.8	-	50.0	7.7	-	11.5
Hickman et al.[51]	1997–2001	51.5	§	§	18.2	#	18.2

VARIOUS SUBSTANCES							
Engström et al.[52]	1973–1994	17.4	1.8	17.8	14.0	#	49.0
Wahren et al.[53]	1973–1994	41.2	2.3	42.7	13.8	This study investigated only external causes of death.	
Eskild et al.[54]	1985–1991	66.6	4.6	10.3	11.6	4.6	2.3
Bartu et al.[55]	1985–1998	30.3	1.8	19.0	15.5	6.5	26.9
BENZODIAZEPINIC DRUGS							
Poser et al. (1992)[56]	1974–1990	7.0	-	27.0	-	2.0	64.0
Piesiur-Strehlow et al. (1986)[57]	1975–1982	9.8	2.4	34.1	7.3	-	46.4

*Cross-sectional study included in this compilation due to the lack of follow-up studies on the mortality of cocaine/crack users

§Percentage not specified by the author (such cases could be included under the heading “other external causes”)

#Percentage not specified by the author (such cases could be included under the heading “other natural causes”)