Cocaine consumption and death risk: a follow-up study on 347 cocaine addicts in the metropolitan area of Bologna

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Summary. This paper reports the results of the mortality rate in a retrospective cohort of cocaine addicts enrolled in treatment programs at the SerTs (Drug Addiction Services) of Bologna's metropolitan area from 1989 to December 31, 2004 including 347 subjects, 89% males and 11% females, with an average age of 30.4 years at the time of enrolment (females 29.1 and males 30.6). 15.3% of the subjects had been at least once in jail, 29.4% were also using cannabis, 22.2% alcohol, 25% had a high school degree, 16% were married and 60% were employed. During the follow-up period, 7 deaths have been observed, all in the male population: one caused by AIDS, one by drug overdose, three by vascular diseases, two by injuries and poisonings. The mortality rate was 4.98 per 1000 person-years in both sexes, 5.38 by the males. The survival chance after 12 years from the first contact with the SerTs was of 89% (CI 66.8-96.7). The death risk goes down after two years from the first enrolment and drops remarkably only after two years from the last contact with the drug treatment service. The study confirms the excess of mortality for all causes of the cohort among males in comparison with the general population (SMR 4.75; CI 2.26-9.96). As to the specific death causes, the highest SMR was related to vascular diseases (SMR 14.85; CI 4.79-46.04), suicides (SMR 7.07; CI 1-50.16) and overdoses (SMR 9.95; CI 1.40-70.61). Males show a higher mortality rate, subjects older than 30 years at the first contact with SerTs, with at least one imprisonment, married, with problematic housing situation, unemployed, with concomitant alcohol abuse and low schooling level.

Key words: cocaine, mortality, longitudinal studies, drug addiction, cardiovascular diseases.

Riassunto *(Consumo di cocaina e mortalità: uno studio di follow-up su 347 cocainomani nell'area metropolitana di Bologna)*. Questo studio presenta i risultati relativi alla mortalità della coorte retrospettiva di cocainomani afferenti ai SerT dell'area metropolitana di Bologna dal 1989 al 31/12/2004: 347 soggetti, 89% maschi e 11% femmine, con età media alla presa in carico di 30,4 anni (femmine 29,1; maschi 30,6). Il 15.3% è stato almeno una volta in carcere, il 29,4% utilizzava anche cannabinoidi, il 22,2% alcol, il 25% aveva il diploma di scuola media superiore, il 16% era coniugato, il 60% lavorava. Durante il periodo di follow-up sono stati osservati 7 decessi, tutti nella popolazione maschile: un soggetto è deceduto per AIDS, uno per overdose, three per malattie del sistema circolatorio, due per traumatismi e avvelenamenti. La mortalità è di 4,98 per mille anni persona nei due sessi combinati, 5,38 per i maschi. La probabilità di sopravvivenza dopo 12 anni dal primo contatto col SERT era dell'89% (IC 66,8-96,7). Il rischio di decesso si abbassa dopo due anni dalla prima presa in carico e si riduce notevolmente solo dopo due anni dall'ultimo contatto col servizio. Tra i maschi si conferma l'eccesso di mortalità per tutte le cause della coorte rispetto alla popolazione generale (SMR 4,75; IC 2,26-9,96). In quanto alle specifiche cause di morte, gli SMR più elevati si rilevano per malattie del sistema circolatorio (SMR 14,85; IC 4,79-46,04), per i suicidi (SMR 7,07; IC 1-50,16) e per l'overdose (SMR 9,95; IC 1,40-70,61). Risultano con un tasso di mortalità più elevato i maschi, i soggetti con più di 30 anni al primo contatto col SERT, con almeno una carcerazione, coniugati, con situazione abitativa problematica, senza lavoro, con abuso concomitante di alcol e bassa scolarità.

Parole chiave: cocaina, mortalità, studio longitudinale, tossicodipendenze, disturbi cardiocircolatori.

INTRODUCTION

All specific studies carried out in the last years report a progressive increase of cocaine use in Italy. The consumption concerns not only the juvenile population and the night-life, but also large parts of the adult population and it goes through social differences, age and gender. These data must be referred to the increase of the population of habitual and occasional users, to the enforcement of the market and to the use of this substance among

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the heroin addicts as an alternative or concomitant to heroin.

The prevalence studies reported in the literature highlight a widespread use in places of amusement, motivated by the pursuit of changes of mood, of particular physical effects, and of the improvement of sociability, an increase of consumption among females, not only among the young and the marginal population, but also among the workers of the third sector with high income and high education [1-8].

This substance has a broad circulation not only in the United States, where it continues to be the greater medical and social problem, but also the countries of the European Union are beginning to perceive an increase of consumption: according to the last published researches, it is estimated that at least 10 millions of people have used cocaine at least once in life and that at least one and half a million of adults have consumed it recently [2].

In Italy the estimate of the phenomenon differs according sources, areas and means, but all data concord on an increase of prevalence of use among the general population, of specific hospitalizations due to problems related to consumption or addiction, of registration of consumers at the NOT (Operative Addiction Units of Prefecture), of SerT patients, among the imprisoned subjects and of seizures carried out by the police forces [3-5].

The data on consumption in the general population are surely underestimated when compared to the real number of regular consumers: cocaine consumption seems to hold an occasional character mostly limited to weekends and recreational sets, where it can reach high levels.

The last studies conducted in Northern Italy help to describe more completely characteristics and problems of consumers groups in some contexts. The consumption results combined with other drugs and alcohol, and that has been associated with anxiety, depression, sleep disorders, possible addiction and high risk of road accidents [6].

Eight percent of 2015 subjects interviewed during raves and concerts have used this substance for the first time during the last year, a data that goes up to 10% of females. Gender differences in cocaine use are reported also by other authors. Weiss [9] for example reports that females cocaine dependent inject less, have a lower first age use, a greater concomitant alcohol abuse, a higher prevalence of anxiety, depression and alimentary disorders.

Bois, Marsden and Strang [7] highlight different motivations as to the use of cocaine related to age and sex: among females the use seems to prevail as "social support" and in pursuit of specific physical effects (in order to lose weight, make sex, stay awake), among males in order to experiment with new drugs and to enhance their effects, among the younger to forget about problems, among the elders to raise euphoria.

The increase of prevalence of cocaine consumption is a quite recent phenomenon, but the growing real risk is that intensive and regular consumption patterns might take root and that the related problems might become evident: the number of new treatment requests at the public services for cocaine addiction in Europe has almost doubled between 1999 and 2004 [2]. During 2005 Italian SerTs have treated 21 619 subjects with primary cocaine abuse and 34 419 with secondary abuse.

This article reports the results of the mortality study on 347 cocaine only users enrolled in treatment programs at one of the Drug Addiction Centres (SerT) of the metropolitan area of Bologna between 1989 and 2004.

The study evaluates the general mortality risk, describes its trend in following periods from 1989 to 2004, estimates the specific contribution of different death causes to the overall mortality rate, its temporal rate and evaluates the association between some possible predictors and mortality. Mortality has also been studied as related to the enrolment time at the SerT and to the time spent after the end of the last therapeutic treatment.

MATERIALS AND METHODS

Enrolled subjects are cocaine addicts who attended at least one therapeutic treatment at one of the 10 SerTs of the metropolitan area of Bologna during the period between January 1, 1989 – December 31, 2004. The inclusion criteria were: cocaine as substance of primary abuse, no heroin and other opiates among the abuse substances, residence in the Province of Bologna during the time of enrolment and having the private data ascertained by the municipal register.

The vital status has been ascertained from January 1, 1989 to December 31, 2004 at the municipalities of last residence. Causes of death have been ascertained at the mortality register of the Public Health Companies (USL) of residence at the date of death according to the codes ICD-IX (International Classification of Diseases Ninth Revision).

Each subject has contributed to the calculation of the person-years at the date of enrolment in the cohort (date of the first therapeutic program attended by the subject at SerT) until December 31, 2004, or at the date of death. The subjects lost at follow-up contributed at the estimate of the person-years until the date of the last recorded residence transfer.

The search of information ended on February 28, 2006.

The direct standardized rates and the relative 95% confidence intervals (standard: Italy 1991, both sexes combined) for all causes, cardiovascular disorders, AIDS; overdoses and suicides, specifics for sex in the whole follow-up period and concerning three distinct periods (1989-1995, 1996-2000, 2001-2004) have been calculated in order to evaluate the temporal mortality rate during the study.

In order to compare the mortality of cocaine addicts with that of the general population, the standardized mortality ratios (SMR) and the exact 95%

relative confidence intervals specific for cause and sex – using as standard the relative specific mortality rates of the population of the Province of Bologna – have been calculated as well.

The SMR, adjusted according to age and calendar-year was calculated as to general mortality and all represented specific causes.

The combined mortality rate has been calculated with the Nelson-Aalen method [10] respectively on males and females; the temporal axis used is the chronological age. In this way the comparison of the mortality rate is set per age, analogically to the previous analysis of external confrontation with the Province of Bologna.

The variables used in the internal analysis are referred to the first enrolment and are those available at the files of the SerTs and taken from the case history files: date of enrolment in the cohort, date of birth, sex, educational degree, professional condition, housing situation, marital status, previous imprisonment, date of first and last contact with the SerTs.

Survival has been calculated with the Kaplan Meier method [11] of the strata of the socio-demographic variables.

An analysis has been carried out in order to evaluate the association between some socio-demographic variables and the general mortality risk, using the model of the proportional risks of Cox [12]. The assumptions of proportionality needed for the model application have been ascertained for each variable evaluating the relative rate of the curves obtained by the graphics of the log [-logS(t)] *vs* time t.

The statistics program STATA has been used for the evaluation of data.

RESULTS

The cohort is composed of 347 subjects, 11% females, with an average age at the enrolment of 29.1 years for females, and 30.6 years for males. The follow-up has come at the 31 of December 2004 or at the date of death in 98.8% of the subjects, the person-years at risk have been 1160 among males and 129 among females.

With regard to the data's quality, the marital state is known in 98% of cases, the housing situation in 98.8%, the professional condition in 95.7%, the study degree in 96%, the HIV condition in 9.2%, the Hepatitis C condition in 39.5%. 15.3% subjects underwent at

Table 1 | *Characteristics of the recruited subjects*

		Females	(%)	Males	(%)
	Total	38	11.0	309	89.0
Previous incarceration	Imprisonment	1	2.6	52	16.8
Secondary substance	Also cannabinoids	12	31.6	90	29.1
	Also alcohol	12	31.6	65	21.0
Sanitary condition	HIV+	1	2.6	2	0.6
	HCV+	3	7.9	12	3.9
Educational degree	University	4	10.5	5	1.6
	High school diploma	14	36.8	56	18.1
	Primary/secondary school	19	50.0	235	76.1
Marital status	Unmarried	27	71.1	229	74.1
	Married	5	13.2	52	16.8
	Widow/separated/divorced	5	13.2	22	7.1
Housing situation	Normal	35	92.1	260	84.1
	Problematic	3	7.9	45	14.6
Professional condition	Employed	21	55.3	187	60.5
	Unemployed	12	31.6	97	31.4
	Non professional condition	4	10.5	11	3.6
Age at first enrolment	≤ 20	4	10.5	28	9.1
	21/30	20	52.6	150	48.5
	31/40	12	31.6	103	33.3
	> 40	2	5.2	28	9.0
Outcome last contact with SerT	In progress	18	47.4	135	43.7
	Completed	13	34.2	109	35.3
	Dropout/expulsed/arrested	7	18.4	47	15.2
	Death			3	1.0
	Other			15	4.9

least one previous incarceration, the others have been considered without previous convictions.

Characteristics

The first subject has been recruited in the study in 1989: 10.3% before 1996, 25.1% during the period 1996-2000, 64.6% during the period 2001-2004. The first death occurred in 1996, and 57% after 2000.

The way of use was known in 92% of the subjects: 76.4% by inhalation (among these subjects the 13.2% was also using drug intravenously, and the 11.3% by smoking it), 21% was using intravenously (among these 48% inhaled and 8.2% smoked), 12.4% smoked (among them 69.8% inhaled and 14% was also using intravenously).

15.3% were at least imprisoned once; a subject out of four had a high school degree, 60% was employed, and half of the subjects was of an age of 25-30 years. *Table 1* shows distinctively for males and females the characteristics of the subjects included in the study. Males show a higher rate of imprisonments than females, with a problematic housing situation and of subjects that work; females instead have a higher education and a greater use of cannabis than alcohol abuse.

The average period of the follow-up was 3.7 years, the average period of contact with SerT 2.1 years, the average time spent since the last contact with the SerT at the end of the follow-up 1.6 years. At the end of the follow-up time 44% was enrolled at SerT.

Proportional mortality

During the follow-up time 7 deaths have been reported, all in the male population: one subject died of AIDS, one of unspecified drug dependence overdose, 3 for cardiovascular diseases (one death for acute myocardium infarction, one for other forms of chronic ischemia, one for ill defined forms and complications of heart pathologies), two for injuries and poisonings (one due to suicide, and the other one for different accidents).

Five deaths concerned subjects who came in touch with a SerT between 1994 and 1998, one in 1989 and one in 2004.

Standardized mortality ratio

Table 2 reports the observed deaths, the expected ones and the standardized mortality ratio for age and period (SMR) and the exact 95% confidence intervals calculated for males for each cause. The standardization per calendar-year and per age allows accounting the temporal mortality rates in the reference population.

The excess mortality is confirmed among males on all causes in the cohort compared to the general population. As to specific death causes, the higher SMR are retrieved as vascular diseases and, even if in a non- statistically significant way, in the group "injuries" and "poisonings".

A more detailed analysis as for the deaths due to vascular diseases indicated a statistically significant risk regarding acute myocardium infarction, other forms of chronic heart ischemia and ill defined forms and complications of heart pathologies.

The study also showed an excess of risk statistically significant regarding suicides and overdoses. The mortality surplus by AIDS is not statistically significant.

Analysis of temporal rates

The temporal rate of the overall mortality is falling since 2000 and goes from 25.16 (CI 0.0-62.66) per 1000 person-year in the 1996-2000 period to 2.51 (CI 0.0-4.90) in the 2000-2004 period.

The mortality in the period is 4.98 (CI 0.0-9.97) in both sexes combined, 5.38 (CI 0.0-10.70) for males. The most relevant death cause is made up by the group of the cardiovascular disorders, with a rate of 3.06 (CI 0.0-7.65), by suicide 0.41 (CI 0.0-1.21), by overdose 0.34 (CI 0.0-1.01), by AIDS 0.33 (CI 0.0-0.98).

Mortality rates

Table 3 reports deaths, person-years, mortality rates and relative 95% confidence intervals per duration of the contact with the SerTs, time passed from the last contact with the SerT, duration of the follow-up, age at the first contact with the SerTs, imprisonments, marital status, educational degree, housing situation,

Table 2 | *Standardized mortality ratio per age and period. Males standard: Province of Bologna*

		Males				
Description	**Cod. ICD IX**	**Observed**	**Expected**	**SMR**	**CI 95%**	
All causes	000_999	7	1.47	4.75	2.26	9.96
AIDS	279	1	0.16	6.17	0.87	43.83
Overdose	304	1	0.10	9.95	1.40	70.61
Cardiovascular diseases	390_459	3	0.20	14.85	4.79	46.04
Acute myocardium infarction	410	1	0.07	15.17	2.14	107.67
Other forms of chronic cardiac ischemia	414	1	0.02	43.27	6.10	307.18
Forms and ill defined complications of heart pathologies	429	1	0.01	81.12	11.43	575.89
Injuries and poisonings	800_999	2	0.58	3.47	0.87	13.87
Suicide	E950_959	1	0.14	7.07	1.00	50.16

SMR: standardized mortality ratio.

Table 3 | *Period 1989/2004. Cocaine addicts enrolled at the SerTs of the metropolitan area of Bologna. Mortality rates/1000 person-years*

		Deaths	PY	Rate	CI	
Duration of contact with SerT	Less than one year	2	317	6.30	1.58	25.20
	1-2	3	427	7.02	2.27	21.78
	2-4	1	241	4.14	0.58	29.42
	> 4	1	303	3.30	0.47	23.45
TSLE	Less than one year	4	893.5	4.47	1.68	11.93
	1-2	2	184.4	10.85	2.71	43.37
	> 2	1	210.7	4.75	0.67	36.70
Duration follow-up	0/3	5	875	5.71	2.38	13.72
	> 3	2	413	4.84	1.21	19.36
Age at enrolment	< 30	0	485			
	30/45	6	721	8.33	3.74	18.53
	> 45	1	83	12.1	1.71	85.95
Imprisonment	No	5	1164	4.30	1.79	10.32
	Yes	2	1245	16.1	4.01	64.20
Marital status	Married	4	986	4.1	1.52	10.80
	Unmarried	2	190	10.52	2.63	42.07
	Widow/separated/divorced	1	62	16.11	2.27	114.40
Educational degree	Primary/secondary school	7	936	7.48	3.57	15.69
Housing situation	Normal	5	1163	4.30	1.79	10.33
	Problematic	2	87	22.91	5.73	91.63
Professional condition	Employed	4	768	5.21	1.96	13.88
	Unemployed	3	389	7.71	2.49	23.91
Alcohol abuse	No	5	1003	5.0	2.08	11.98
	Yes	2	286	7.0	1.75	27.98
Outcome last program at SerT	Completed	1	483	2.07	0.29	14.70
	Dropout/expulsion/arrest	1	229	4.37	0.62	31.01
	Other	1	158	6.33	0.89	44.96

TSLE : time since last entry; CI: confidence interval.

professional condition, concomitant alcohol abuse and outcome of the last contact with SerT.

The mortality rate falls by the subjects being treated since more than two years and after two years from the last contact with SerT. The subjects "enrolled" dead are 4, whose two have died by cardiovascular diseases.

Also the influence of the follow-up time affects mortality with less high mortality rates for those with more than three years of observation.

Subjects more than 30 years old at the first contact with SerT, with at least one imprisonment, married, with problematic housing situation, unemployed and with concomitant alcohol abuse show a higher mortality rate. All deceased subjects were poorly educated. The ones who did not complete the last therapeutic program at SerT show a higher rate.

Risk profile

The univariata analysis carried out with the proportional risks model of Cox, even with not statistically 95% significant results, confirms what reported above. *Table 4* shows the results.

Greater risk results for the subjects with at least one imprisonment, married, with problematic housing situation and unemployed.

Furthermore the risk drops by the duration of contact with SerT of two years and after two years from the last contact with SerT.

Survival analysis

The 5 years survival rate from the first contact with SerT is 97.6 % (CI 94.0-99.01), after 10 years is 95.4% (CI 86.9-98.4), after 12 years 89% (CI 66.8-96.7).

After 10 years from the first contact with SerT the

Table 4 | *Period 1989/2004. Cocaine addicts enrolled at the SerTs of the metropolitan area of Bologna. Proportional risks model of Cox - univariata analysis*

		RR	CI	
Duration of contact with SerT	Less than one year	1		
	1-2	1.19	0.20	7.17
	2-4	0.56	0.05	6.31
	> 4	0.29	0.03	3.24
TSLE	Less than one year	1		
	1-2	2.30	0.40	13.03
	> 2	0.66	0.07	5.97
Imprisonment	No	1		
	Yes	3.13	0.59	16.69
Marital status	Unmarried	1		
	Married	1.39	0.23	8.44
	Widow/separated/divorced	2.35	0.20	27.08
Housing situation	Normal	1		
	Problematic	4.52	0.81	25.24
Professional condition	Employed	1		
	Unemployed	2.31	0.50	10.61

TSLE: time since last entry; CI: confidence interval.

observed survival was 86% for those who had concomitant alcohol abuse and 97% for the others; 63% for the married, 95% for the widow/separated/divorced and 98% for the singles; 87% for those with problematic housing situation and 96% for those with normal housing situation; 94% for the subjects employed and 95% for the others.

DISCUSSION

The subjects included in this study are not representative of the universe of this substance's consumers, since only some of regular cocaine users attend a drug addiction centre. The number of subjects and the number of overall person-years are too few for a cohort study and that, apart from restricting the possible statistical analysis, suggests a particular caution when interpreting the results. The data used are the ones available from the files on hand at the SerTs of the Region Emilia-Romagna and it has been not possible to consider data concerning the age at the first use, average consumption and time of consumption, since they have not been retrieved uniformly by the operators.

Furthermore, we should report the difficulty of the contact with this particular typology of drug users; in fact the researches conducted on the recreational users and on their consumption of psychoactive substances highlight the basic diversities between this target and the users of public and private drug addiction services.

Nevertheless, the results offer an interesting picture of the phenomenon, especially with regard to the overall mortality rate and the identification of the specific death causes.

Also, it must be specified that the only cohort study on mortality of cocaine addicts published in the international literature is related to the crack users [14].

THE COCAINE ADDICTS

This paper is based on a cohort of cocaine addicts that went to the SerTs, and that is characterised by the long duration of follow-up: the observation period lasts 15 years and goes to December 2004, with an average duration of 3.7 years per subject.

The characteristics of the included subjects are substantially different from those of the cohorts of heroin addicts enrolled by the SerTs, as a matter of fact we find high percentages of subjects who work, highly educated and with normal housing situation, and few subjects with previous imprisonment and positive to Hepatitis C and to HIV. A subject out of five had a concomitant alcohol abuse.

This data make us consider the effective risk to develop cocaine addiction, a risk that results transversal to the different socio-economical characteristics of output. In this case it would be interesting to deepen the analysis of the users universe in order to study the mechanisms that lead some subjects to develop addiction and others not to, and whether there are protecting factors connected to a different risk perception or to the preparation of particular prevention strategies.

In our study, for instance, a substantial difference in gender is highlighted as to the characteristics of the users and of mortality.

All deaths pertain to males and subjects with only the primary and secondary school degree. Furthermore, the characteristics of females are different compared to those of males: student, younger, high education, major alcohol abuse, minor prevalence of previous imprisonments.

This data confirms what is reported in literature: girls who consume drugs are on average younger than males, start to use them at an older age, and that highlights the recent start of cocaine use [6, 9, 13].

THE DEATH RISK

A high general mortality risk is configured in our cohort, concentrated in males and after 1996, in potential fall from 2000: first cause of death are cardiovascular disorders. The survival chance after 12 years from the first contact with the SerT is 89%.

About the weight of single causes, as main constituents of the observed excess mortality, we find excesses of cardiovascular diseases, overdoses and suicides.

The major death risk by cardiovascular disorders confirms what referred in literature, particularly for what concerns chronic users with continuative use, even though the authors specify that the cause of these deaths can be due to the interaction of more factors [15-22]. The consumption of cocaine causes several negative effects on the cardiac system, but the only clear effect – except for subjects with other physical or hereditary problems, and apart from overdoses due to hyper-dosing – is that the process requires a medium long time to develop [18].

The overdose death risk has been broadly described in other studies, most of them reports that the main death risk is caused by the consumption of cocaine when associated with other opiates (particularly heroin) and alcohol. Overdose experience is frequent among the drug addicts; the mostly associated factors are age of beginning of drug addiction, gravity of drug addiction, concomitant use of other substances, alcohol use. In our study it was not possible to evaluate them and that could have partially thwarted the results.

Death risk for AIDS has been reported in other studies where both cocaine and heroin users were examined.

HEALTH HARMS AND MORTALITY

Cardiovascular disorders linked to cocaine use have been reported by several authors [15, 16]; even though the risks should be confined to the only acute effects, according to some studies [17]. According to Karch [18] the deaths due to cocaine-related vascular problems are not dose-related and the modified blood values alone do not predict lethality. In addition, the cause of death is multi-factorial, including hereditary factors and diet, and the major part of deaths concerns chronic users with continuative use.

Many articles of forensic toxicology report high percentages of cocaine positive subjects among the victims of road accidents. Mac Donald [19] has evaluated all studies published from 1989 to 2001 reporting blood or urine test results performed in relation to road accidents, violent acts or other injuries. Among the deaths due to street accidents the quote share percentage of subjects found positive to cocaine varied from 0.3% to 9.8% among murderers from 9% to 40%.

In a recent study Darke [20] reports the results of 146 deaths related to cocaine use in Australia from 1993 to 2002. The deaths concerned in 86% of the cases a drug overdose, in 11% cardiovascular problems, in 8% suicide. In 86% of the cases cocaine was the direct death cause, 53% of the subjects had died at home, and in 79% of the cases the use was associated to other opiates, in 15% to alcohol.

Analyzing 7451 lethal overdoses in New York City from 1990 to 1998 Coffin [21] reports that 57.8% of these deaths was relative to the combination of at least two substances among other opiates, cocaine and alcohol. The death rate for only cocaine was of 2.76 for 100 000 people-year, and 2.19 for heroin combined to cocaine, that results to be the most frequent substance combination.

In a multi-centric study on 396 only-cocaine users conducted in 1998 in Brazil, Mesquita [22] reports that 20% had experienced one or more overdoses. That risk was higher for the females and for those who had an imprisonment experience.

In a follow-up study conducted in the USA on 321 cocaine dependent veterans admitted to drug treatment after 12 years from the first access to the West Los Angeles Veterans Affairs Medical Center, Hser [23] reports 28 deaths: 22% for overdose, 22% for AIDS, 15% due to accidental and violent causes, 15% for cardiovascular disorders. The death risk was higher for those enrolled for treatment when older than 40 years.

The death risk results associated not only to risk behaviours, but also to determinate environment circumstances: Marzuk [24] retrieves an association between the temperature variation towards high values and a consistent increase of cocaine overdoses.

A few considerations

The analysis of the socio-demographic determinants has highlighted some important characteristics associated to a higher mortality, and the results relating to the role of socio-demographic variables in defining the risk profile partially match up to other reports on drug addicts mortality [25-30]: there is a higher mortality rate among males, subjects at the first enrolment older than 30 years, subjects with at least one imprisonment, with concomitant alcohol abuse, low education, problematic housing situation and unemployed. This means that within the condition of drug addiction,

already problematic in itself, drawbacks are observed due to their social condition.

Regarding the relationship between enrolment at SerT and mortality, it is reported that subjects with completed therapeutic program show lower mortality rates, that the death risk drops after two years from the first enrolment, and that it comes down markedly only two years from the last contact with the service.

The major death risk for subjects older than 30 years at first enrolment at the service highlights how the decision to apply to SerT to get a treatment is also due to physical, economical and juridical problems turned up after protracted consumption.

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