ORIGINAL ARTICLE

Cocaine use and its relationship with cardiovascular pathology and trauma seen in an emergency department

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Objective: To determine the prevalence of cocaine use among patients seen in the emergency department of a tertiary hospital for trauma or cardiovascular disorders and in whom there was no obvious relationship with cocaine use and none was spontaneously declared by the patient. We also analyzed whether this substance abuse was associated with a greater use of health care resources.
Material and methods: Between October 2005 and September 2006, urine samples were collected from patients over 16 years of age who were seen in the emergency department for trauma of any severity or chest pain of probable cardiovascular origin. The cocaine levels were measured in urine using a semiquantitative fluorescence polarization immunoassay.
Results: We studied 325 cases, 206 with trauma and 119 with chest pain. The overall prevalence of undisclosed use was 19.7%; the prevalence was 18.9% among trauma patients and 21% among those with chest pain. In cases of trauma, cocaine use was significantly associated with more frequent requests for blood tests ($P < .05$), whereas no differences in the use of health care resources for chest pain patients were observed.
Conclusions: There is a high prevalence of undisclosed cocaine use among patients attending an emergency department in relation to cardiovascular complaints or trauma. When cocaine use is not the direct reason for the patient's visit, it does not appear to lead to a marked variation in health care costs during the acute phase of emergency treatment. [Emergencias 2008;20:380-384]

Key words: Cocaine. Chest pain. Trauma.

Introduction

The consumption of cocaine in Spain has increased greatly[1,2] heading that of Europe and being similar to that of the United State[3-5]. Some results have indicated that the Canary Islands may be one of the regions with the highest consumption[3,6].

Since 1986 cocaine has been the main cause of consultation for drug abuse in hospital emergency departments (HED) in the United States, having an important causal relationship with the cases of injury, homicides, suicides and traffic accidents[7].

The relationship between chest pain and cocaine is clear, particularly in subjects under the age of 45 years[8,9]. It also seems that, similar to ethanol, drugs may be involved in traffic accidents, accidental injuries and/or violent traumatisms[11].

Several studies in Spain have been published on consultations for problems related to cocaine intake. However, the prevalence of consumption in HED users is unknown. This consumption is occult and is, therefore, not identified as the reason for consultation.

The aim of this study was to determine the incidence of cocaine consumption among users of HED for trauma or cardiovascular disease and whether this consumption has an impact on greater hospital costs either due to the increase in complementary tests or to an increase in emergency department and/or hospital stay.

Table 1. Characteristics of the patients included in the study according to the reason for consultation and the result of cocaine determination

	Total patients N = 325	Patients with traumatism N = 206	Patients with chest pain N = 119	*P*	Cocaine + cases N = 64	Cocaine – cases N = 261	*p*
Age-years	33 ± 10.7	33 ± 10.6	35 ± 10.9	0.09	31 ± 9.2	34 ± 11.1	0.06
Male sex: nº (%)	273 (86.1)	174 (87.4)	99 (84.0)	0.24	52 (81)	221 (87.3)	0.57
Cocaine (+); nº (%)	64 (19.7)	39 (18.9)	25 (21)	0.66	–	–	–
Time in HED; hours	11 ± 13.6	12 ± 14.3	9 ± 11.9	0.002	10 ± 7.6	11 ± (14.7	0.15
Admission; nº (%)	105 (32.9)	73 (36.5)	32 (26.89)	0.049	21 (32.8)	84 (32.9)	0.5
Time of admission; days	7 ± 15.3	10 ± 18.4	4 ± 9.2	< 0.001	7 ± 14.3	7 ± 15.6	0.96
Analysis; nº(%)	295 (90.8)	189 (91.8)	106 (89.1)	0.27	63 (99.4)	232 (88.9)	0.009
Nº analyses: mean (SD)	2.1 ± 3.85	2 ± 2.92	3 ± 4.98	0.002	2 ± 1.8	2 ± 4.20	0.63
X-ray; nº (%)	272 (83.5)	170 (82.5)	102 (85.7)	0.50	57 (89.1)	215 (82.4)	0.26
Nº of x-rays	1 ± 1.5	1 ± 1.13	1 ± 1.97	0.27	1 ± 0.95	1 ± 1.60	0.42
ECG; nº (%)	98 (30.1)	20 (9.7)	78 (65.6)	0.001	18 (28.1)	80 (30.7)	0.41
CT; nº (%)	102 (31.4)	79 (38.4)	28 (23.51)	0.008	20 (31)	87 (33.3)	0.44
Echography; nº(%)	11 (3.4)	7 (3.4)	4 (3.3)	0.99	3 (4.7)	8 (3.1)	0.70

HED: hospital emergency department; ECG: electrocardiogram; CT: computerised tomography; SD: standard deviation.

Methods

From October 2005 to September 2006 urine samples were prospectively collected from patients from 16 to 65 years of age attending an emergency department of a tertiary level hospital for traumatism of any severity secondary to a traffic accident or assault or non traumatic chest pain of probable cardiovascular origin and who did not explicitly or spontaneously report cocaine intake. Consent was obtained from all the patients. The samples were stored at –30ºC until posterior analysis.

The sample size was calculated for around 55,000 visits/year to the emergency department, excluding paediatric and obstetric/gynaecological patients, and with a percentage of traumatisms and chest pain of 25%-35% and 10%-20%, respectively. The final sample size of 194 patients was calculated with a power of 80% and type I error of 5% in the estimation of populational proportions of the study groups. The hospital has a reference population of 400,000 inhabitants (northern area of the Island of Tenerife and the Island of La Palma) and it is located in the centre of a metropolitan area of 200,000 inhabitants (municipalities of La Laguna and Santa Cruz de Tenerife).

The following variables were studied: age and sex, reason for consultation (traumatism or chest pain), request or not for complementary tests (blood analyses, radiography, computerised tomography (CT) and echography (Eco), number of tests performed, outcome of patient (admission/discharge/death), length of emergency department stay when the patient was not admitted and days of hospital stay.

The determination of cocaine in urine was performed with a semiquantitative assay with a fluorescence polarisation immunoassay (FPIA) (AxSYM System, Abbott Laboratories, Illinois, USA) and the levels of cocaine (benzoilecgonine and methylecgonine ester) were measured. The presence of cocaine values greater than 300 mg/mL was considered as positive.

Categorical variables are expressed with frequencies and percentages and the ordinal and numerical variables are shown as means and typical deviations. Proportions were compared with the Chi-square, Fisher exact and Jonckeree-Terpstra tests accordingly. Comparisons of ranges were performed with the Kruskal-Wallis, Mann-Whitney U test and the Wilcoxon-Mann-Whitney test as required. Significance was considered with p value < 0.05. The statistical analyses were carried out with the statistical programmes v.5.5 (StatSoft; Tulsa,OK, USA) and StaXact v.5 0.3 (Cytel Soft Co., Cambridge, Ma, USA). The study was approved by the Ethical Committee of Clinical Investigation of the centre.

Results

A total of 325 patients were included (206 patients with traumatisms and 119 with chest pain) and their demographic and healthcare characteristics are shown in Table 1. Statistically significant differences were observed between the two pathologies in regard to the greater length of emergency department stay and a longer duration of admission and a higher percentage of CT in the traumatisms, while the number of analyses and electrocardiograms (ECG) was higher in patients with chest pain. The global prevalence of undeclared cocaine consumption was 19.7% with no differences between traumatisms (18.9%) and chest pain (21%).

Table 2. Characteristics of the patients with traumatisms related to positive or negative determination of cocaine

	Totaql nº patients with traumatism N = 206	Cocaine + patients N = 39	Cocaine _ patients N = 167	*P*
Age-years	33 ± 10.6	32 ± 9.4	33 ± 10.9	0.91
Male sex; nº (%)	174 (87.4)	34 (87.1)	140 (87.5)	0.99
Time in HED – hours	12 ± 14.3	12 ± 7.6	12 ± 15.6	0.07
Admission – nº(%)	73 (36.5)	14 (35.9)	59 (35.3)	0.99
Length of admission; days	10 ± 18.4	8 ± 15.8	10 ± 19	0.90
Analyses; nº (%)	189 (91.8)	39 (100)	150 (89.8)	0.047
Nº analyses; mean (SD)	2 ± 2.92	1 ± 0.91	2 ± 3.2	0.13
X-ray; nº (%)	170 (82.5)	35 (89.7)	135 (80.8)	0.12
Nº of x-rays	1 ± 1.14	1 ± 0.64	1 ± 1.2	0.82
ECG; nº (%)	20 (9.7)	1 (2.6)	19 (11.4)	0.13
CT; nº (%)	79 (38.4)	16 (41.0)	63 (37.7)	0.90
Echographies; nº (%)	7 (3.4)	2 (5.1)	5 (3.0)	0.62

HED: hospital emergency department; SD: standard deviation; ECG: electrocardiogram; CT: computerised tomography.

The patients with cocaine consumption had a mean age of 31 years (± 9.2) and were mainly males (81%). Except for the number of analyses (p = 0.009) there were no differences between consumers and non consumers in the parameters studied (Table 1).

In the group of patients with traumatisms (Table 2), it was found that those who had consumed cocaine were only differentiated from those who had not in that they had had more blood analyses. In contrast, in the patients with chest pain (Table 3) the consumption of cocaine was significantly associated with a lower age but with a greater use of resources.

Discussion

The main finding of this study was that practically 20% of the patients with traumatism or chest pain presented recent cocaine consumption, despite this not being the reason for the consultation to the emergency department. In the 2007 report of the Spanish Observatory on Drugs (OED) referring to data from 2005, of 7,089 emergencies for drug consumption, 63% were related to the use of cocaine and this was the cause for healthcare assistance in 55.5%[2]. With regard to this report, our series coincides with the mean age (31 years in the OED) and the proportion of males is similar (84% versus 75% in the OED). In addition, the percentage of admissions in our series was 32.8% compared to 10.2% in the OED, although the differences in the number of admission related to having or not having consumed cocaine were not statistically significant[2].

The results of prevalence with respect to chest pain were somewhat lower than the 25% reported by Sanjurjo et al[12] but agree with those of the classical study by Hollander et al concerning hospitals in urban settings with 20%[9]. Nonetheless, the study by Sanjurjo was focused on patients with clinical suspicion of consumption[12] therefore our data may be closer to the reality of the pattern of hospital emergency department users with occult cocaine consumption. In cases of cardiovas-

Table 3. Characteristics of the patients with chest pain related to positive or negative determination of cocaine

	Total nº patients with chest pain N = 119	Cocaine + patients N = 25	Cocaine – patients N = 94	*P*
Age-years	35 ± 10.9	30 ± 8.9	36 ± 11.1	0.03
Male sex; nº(%)	99 (84.0)	18 (83.9)	81 (86.2)	0.12
Time in HED – hours	9 ± 11.9	7 ± 6.5	9 ± 12.9	0.98
Admission – nº(%)	32 (26.89)	7 (28.0)	25 (26.6)	0.99
Length of admission; days	4 ± 9.2	5.4 ± 12.2	3 ± 8.4	0.72
Analyses; nº (%)	106 (89.1)	24 (96.0)	82 (87.2)	0.30
Nº analyses; mean (SD)	3 ± 4.98	2 ± 2.6	3 ± 5.4	0.78
X-ray; nº (%)	102 (85.7)	22 (88.0)	72 (76.6)	0.28
Nº of x-rays	1 ± 1.97	1 ± 1.3	2 ± 2.1	0.24
ECG; nº (%)	78 (65.6)	17 (68.0)	61 (64.9)	0.82
CT; nº (%)	28 (23.51)	4 (16)	24 (25.5)	0.43
Echographies; nº (%)	4 (3.3)	1 (4.0)	3 (3.2)	0.99

HED: hospital emergency department; SD: standard deviation; ECG: electrocardiogram; CT: computerised tomography.

cular problems attributed to consumption, the percentage of care related to cocaine ranged from 16% in the study by Rich et al[14] to 56.2% by Brody et al[15].

With respect to traumatisms, the percentage of 19% in the present study was higher than that of other series in the literature which range from 6% to 12%, despite these series exclusively analysing cases of severe polytraumatisms and not traumatisms of any severity as in our study[10,11,15]. Moreover, cocaine was related to the cases due to aggressions and penetrating traumatisms which present, a priori, the greatest severity[11,16]. In Spain, this substance is present in 7.4% of the deaths by traffic accident[17]. Although the severity of the patients with traumatism was not studied here, cocaine positive patients did not present significant differences with regard to stay in the emergency department, hospital admission, hospital stay or in the complementary tests performed.

Contrary to what might be thought[6], cocaine consumption is not clearly and markedly associated with a greater consumption of healthcare resources. Statistically significant differences were only observed in the number of analytical tests performed in cocaine consumers with traumatism and this difference was maintained in the case of analyses in which the reasons for consultation for cocaine positive patients were not differentiated. This result, however, does not include the healthcare problems derived from the chronic consumption of cocaine on the cardiovascular system[18,19]. In addition, since the cases of deaths by traumatisms (traffic accidents or assaults) which do not arrive to the hospital were not analysed, this conclusion should perhaps be quantified in the future.

One of the limitations of this study was the need for consent from the patients for their participation and, thus, the values of prevalence should be taken with caution: occult consumption may be greater if it is considered that part of the refusals to participate were cocaine consumers, or to the contrary, that those who accepted to participate did so because they believed that refusal would compromise the healthcare received. We lean to the first option, and suggest that the incidence of consumption may be greater than that reported.

The number of ECG performed may be underreported among the complementary tests since it was the only examination technique which was included in the computer programmes of our centre at the time of the study. Thus, the calculation of this test was made directly in the clinical history and the nursing registries. Together with the underreporting of the number of ECG the direct costs may also be much less than the remaining complementary tests, being almost similar to the measurement of blood pressure or a pulsioxymetry determination. Another limitation may be having determined the toxic in urine samples in which there is the possibility of false positivity. In the future blood samples analysed by gas chromatography/mass spectrometry or liquid chromatography may be necessary[11].

The main conclusion of the present study is the underdiagnosis of cocaine consumption in patients attended in the hospital emergency departments[20], at least in the two reasons for consultations studied in which a prevalence of practically 20% was obtained. This should be taken into account by clinicians for determined medical actions (observation periods for chest pain in the emergency departments[21,22] or coronary interventions[23] for possible modifications in the anaesthesia procedures, etc.) and in the designing of healthcare protocols (inclusion of routine screening for drugs in determined clinical and pathologic situations[24,25], etc.). Nonetheless, this occult consumption will probably not modify the actions of the clinicians or imply a greater healthcare expense in the acute phase of these diseases when they are not directly the reason for consultation or the patient does not relate the need for care to the use of cocaine. This does not mean that we should not be worried about the chronic effects of this consumption such as the cardiovascular problems due to continuous cocaine use and their long term repercussion on healthcare[18,19]. Further studies are clearly required in our country on these and other groups of diseases, especially in patients of greater severity, to confirm these initial data with respect to emergency department healthcare.

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Consumo de cocaína y su relación con patología cardiaca y traumática atendida en un servicio de urgencias

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Objetivo: Conocer la prevalencia de consumo de cocaína entre usuarios que consultan a un servicio de urgencias de un hospital de tercer nivel por patología traumática o cardiovascular, sin que exista una relación evidente de consumo y sin que el usuario hiciera explícito de manera espontánea dicho consumo, así como si dicho consumo se asocia a una mayor utilización de recursos sanitarios.
Método: Entre octubre de 2005 y septiembre de 2006 se recogieron muestras de orina a los pacientes mayores de 16 años que acudieron a urgencias por un traumatismo de cualquier gravedad o un dolor torácico de probable causa cardiovascular. Se determinaron los niveles de cocaína en orina mediante ensayos semicuantitativos con tecnología de inmunoanálisis de polarización de la fluorescencia (FPIA).
Resultados: Se obtuvieron 325 casos (206 traumatismos y 119 dolores torácicos). La prevalencia global de consumo no declarado de cocaína fue del 19,7% (18,9% para los traumatismos y 21% para el dolor torácico). En los traumatismos, la presencia de cocaína se asoció de forma significativa a una mayor petición de analítica ($p < 0,05$), en tanto que en el dolor torácico no se observaron diferencias en el consumo de recursos.
Conclusiones: El consumo de cocaína no declarado entre los usuarios de un servicio de urgencias con patología cardiológica o traumática presenta una prevalencia alta. No parece que este hecho modifique en gran medida el gasto sanitario en la fase de atención aguda de estas patologías, cuando no son directamente el motivo de consulta del paciente. [Emergencias 2008;20:380-384]

Palabras clave: Cocaína. Dolor torácico. Traumatismo.