

REUE | Original Article

Differences in clinicoepidemiologic characteristics of chemical submission according to type of crime

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OBJECTIVE. To identify possible differences between substances used for drug-facilitated crime (DFC) (sexual assault, theft) or chemical submission in the absence of evidence of a crime.

METHODS. Prospective observational study of cases of suspected DFC between 2017 and 2023. A spontaneous urine sample was collected from all patients for testing by liquid chromatography with tandem mass spectrometry for toxic substances.

RESULTS. We studied 87 patients suspected to be victims of DFC or under chemical submission. No crime could be ascertained in a majority of cases (52.9%); sexual assault was committed in 19.5% and theft in 27.6%. Most of the victims of sexual assault were women whereas the victims of theft were more often men ($P < .001$). Two or more substances were detected in 53% of the sexual assault cases, whereas in 75% of the cases of theft and 87% of cases with no evidence of a crime, no substance or a single substance was detected ($P = .006$). Alcohol was the substance most often identified, followed by tetrahydrocannabinol. The sexual assault cases less often involved a substance (in 29.4%) and more often involved vulnerability (in 47%). In contrast the substance vs vulnerability figures were 54.1% and 29.2%, respectively, for theft, and 6.52% and 2.2% when there was no evidence of a crime ($P < .001$, all comparisons).

CONCLUSIONS. In a majority of cases in which substances are detected, it is not possible to find evidence that a crime was committed. Most victims of sexual assault DFC are women. Alcohol is the substance most often detected. The likelihood of chemical submission was highest in cases of theft in this cohort.

Keywords: Hospital emergency department. Drug-facilitated crime. Chemical submission. Sexual assault. Theft.

Características clínico-epidemiológicas de la sumisión química: diferencias entre grupos según el delito cometido

OBJETIVOS. Identificar las posibles diferencias entre las sustancias utilizadas según el objetivo de la sumisión química (SQ) –agresión sexual, robo o sin evidencia de delito–.

MATERIAL Y MÉTODOS. Estudio observacional prospectivo de los casos con sospecha de sumisión química atendidos entre los años 2017 y 2023. A todos los pacientes se les recogió una muestra de orina para la posterior determinación de sustancias tóxicas por cromatografía líquida combinada con espectrometría de masas.

RESULTADOS. Se registraron 87 pacientes con sospecha de SQ. En el 52,9% de los casos no se observó delito, un 19,5% fueron casos de agresión sexual y un 27,6% de robo. Entre las víctimas con sospecha de agresión sexual existía un predominio de mujeres, mientras que en los casos de robo predominaban los varones ($p < 0,001$). Se detectaron dos o más sustancias tóxicas en el 53% de los casos de agresión sexual, y ninguna o una en el 75% de los casos de robo, y en el 87% de los casos sin evidencia de delito ($p = 0,006$). El tipo de sustancia más frecuentemente detectada fue el etanol, seguido del tetrahydrocannabinol. En los casos de agresiones sexuales hubo menos casos de SQ probable y más de vulnerabilidad (29,4% y 47% vs 54,1% y 29,2% en el grupo de robo y 6,52% y 2,2% en el grupo de no delito; $p < 0,001$ en ambas comparaciones).

CONCLUSIONES. En la mayoría de los casos de sospecha de SQ no fue posible demostrar la posible comisión de un delito. Las víctimas de agresiones sexuales son predominantemente mujeres. La sustancia detectada más prevalente fue el etanol. La prevalencia de SQ probable fue más elevada en el grupo de robo.

Palabras clave: Urgencias hospitalarias. Sumisión química. Agresión sexual. Robo.

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Introduction

Chemical submission (CS) consists of administering chemical substances to a person without their knowledge for criminal purposes.¹ CS is also known as “drug-facilitated crime” or “drug-facilitated sexual assault” when used to commit sexual offenses.

According to the French National Agency for the Safety of Medicines and Health Products, CS is considered confirmed when an assault or attempted assault is documented, and probable when an assault is suspected but sufficient clinical information or conclusive analytical results are lacking. The term chemical vulnerability is used when the victim acknowledges voluntary consumption of substances.² Currently, the terms proactive CS (when the perpetrator administers substances without the victim’s knowledge), opportunistic CS (when the victim acknowledges voluntary consumption of toxic substances), and mixed CS (when both conditions occur) are also used.^{1,3}

The use of substances to manipulate a person’s will is not new, but its frequency appears to have increased in recent years.⁴ In Spain, the first guidelines for the management of these patients were published in 2013.⁵ The most common crime is sexual assault, although others, such as robbery or, in minors, abuse or behavioral manipulation, have also been reported.¹ The substances used must be effective at low doses, have amnesic effects, and be rapidly eliminated from the body. Ideally, they should be colorless and tasteless so that the victim cannot detect them.

Many studies have focused primarily on CS in victims of sexual offenses,^{6,7} with a recent study analyzing cases by sex.⁸ However, since CS can be used to commit different types of crimes, clinical-epidemiological characteristics and toxic substances involved may differ depending on the crime. The objective of this study was to identify possible differences in the clinical-toxicological characteristics of CS cases according to the type of crime committed.

Material and methods

We conducted a prospective observational study with retrospective data review with patients presenting with suspected CS between 2017 and 2023 at the Emergency Department of Hospital del Mar in Barcelona (Spain) and its associated Primary Care Emergency Center (CUAP Peracamps).

Patients were categorized into 3 groups according to the type of crime: victims of sexual assault, victims of robbery, and those in whom no crime could be verified—that is, victims who reported neither sexual assault nor attempted assault and had no personal belongings stolen. In cases where both sexual assault and robbery occurred in the same victim, sexual assault was considered more relevant and classified in the first group.

For each subject, demographic data (age, sex, ethnicity, Barcelona resident or foreigner), type of crime (sexual assault and/or robbery), history of psychiatric disorders and addiction, and history of prior assaults were collected. Additionally, it was determined whether CS was proactive, opportunistic, or mixed, and whether it was a confirmed or probable case. Chemical vulnerability was also recorded.

All patients provided a urine sample, which was processed and frozen at -20°C for subsequent toxicological analysis using liquid chromatography along with mass spectrometry.^{9,10} The following substances were analyzed: amphetamine, methamphetamine, MDA, MDMA, MDEA, benzoylecgonine, amino-flunitrazepam, nordiazepam, diazepam, oxazepam, lorazepam, alprazolam, clonazepam, clorazepate, tramadol, morphine, 6-monoacetylmorphine, codeine, methadone, fentanyl, ketamine, nor-ketamine, alpha-PVP, mephedrone, L-atropine, scopolamine, THC-OHH [tetrahydrocannabinol (THC) metabolite], and ethyl glucuronide.

In cases of CS with alleged or suspected sexual assault, the victim was subsequently referred to Hospital Clínic de Barcelona for forensic evaluation, according to the current protocol in the city of Barcelona.

Statistical analysis was performed using R software for Windows. Student’s t test or the Mann-Whitney U test was applied for comparison of quantitative variables, and the chi-square test with Fisher or Pearson correction, as needed, for qualitative variables. Results were expressed as number (percentage) or mean (standard deviation). A *P* value $< .05$ was considered statistically significant.

The study was conducted in full compliance with the principles outlined in the Declaration of Helsinki and approved by the institutional ethics committee (2023/10841).

Results

During the study period, a total of 87 cases of suspected CS were identified. The mean age of victims was 28.7 (12.4) years; 62.1% were women, and 56.3% were non-Spanish nationals. Seventeen cases involved alleged sexual assault (19.5%), 24 involved robbery (27.6%), and in 46 cases (52.9%) no evidence of crime was found. Victims of robbery were older [36.7 (17.2) years vs 25.2 (7.1) years in the sexual assault group and 25.8 (8.8) years in the no-crime group; *P* = .016]. Women predominated among sexual assault victims and those with no confirmed crime, whereas men predominated in robbery cases (94.1% women in the sexual assault group, 71.7% in the no-crime group, and 79.1% men in the robbery group; *P* < .001). Regarding nationality, there was a higher prevalence of foreigners in the sexual assault and no-crime groups (53% and 60.9%, respectively), while the robbery group included 50% Spanish and 50% foreign victims. In confirmed CS cases, sexual assault victims were predominantly young, non-Spanish women, whereas robbery victims were mostly non-Spanish men around 35 years old. No differences were found in psychiatric history or addiction history (Table 1).

At discharge, among the 17 victims with confirmed or suspected sexual assault, 8 (47.1%) were discharged directly from the emergency department, and 1 requested voluntary discharge. The remaining 8 (47.1%) were referred to Hospital Clínic following the sexual assault protocol. Those not transferred declined referral. Of the 24 robbery victims, 23 (95.8%) were discharged directly from the emergency department (1 requested voluntary discharge).

Table 1. Baseline characteristics of cases with suspected chemical submission according to type of crime

	Sexual assault N = 17 n (%)	Robbery N = 24 n (%)	No evidence of crime N = 46 n (%)	Total (N = 87) n (%)	P value
Age (years) [mean (SD)]	25.2 (7.1)	36.7 (17.2)	25.8 (8.8)	28.7 (12.4)	.016
Sex					< .001
Female	16 (94.1)	5 (20.9)	33 (71.7)	54 (62.1)	
Male	1 (5.9)	19 (79.1)	13 (28.3)	33 (37.9)	
Nationality					.624
Spanish	8 (47)	12 (50)	18 (39.1)	28 (43.7)	
Foreign	9 (53)	12 (50)	28 (60.9)	49 (56.3)	
Psychiatric history	1 (5.9)	2 (8.3)	4 (8.7)	7 (8.1)	1.000
Addiction history	2 (11.7)	5 (20.8)	7 (15.2)	14 (16.1)	.792

Bold values indicate statistical significance ($P < .05$).

The most frequently detected substance across all 3 groups was ethanol (ethyl glucuronide levels ranged from 1.0 to 675.2 $\mu\text{g/mL}$), especially in the sexual assault group (64.7% positive) vs 45.8% in the robbery group and 73.9% in the no-crime group ($P = .015$ and $P = .025$, respectively). Among other substances detected, THC was the most prevalent across all 3 groups (16.7% in robbery cases, 23.5% in sexual assaults, and 10.9% in no-crime cases; $P > .05$). In sexual assault victims, higher percentages of cocaine ($P = .014$) and multiple substances were observed (53% positive for ≥ 2 substances) (Table 2).

No significant differences were found in the prevalence of confirmed CS across the groups (23.5% in sexual assault, 16.7% in robbery, and 4.3% in no-crime; $P > .05$). However, differences were observed in probable CS (29.4% in sexual assault, 54.1% in robbery, and 6.5% in no-crime; $P < .001$). Chemical vulnerability was more frequent in the sexual assault group (47%) than in robbery (29.2%) or no-crime (2.2%) cases ($P < 0.001$) (Table 3).

Discussion

Our study shows that in more than half of cases presenting with suspected CS, the victim reported neither sexual assault nor attempted assault and had no personal belongings stolen (52.9%).

As in former studies,⁶⁻⁸ we found a higher proportion of women among presumed sexual assault victims and a higher proportion of men among robbery victims.¹¹ The mean age of sexual assault victims was similar to that from other studies,^{1,4,6-8} while robbery victims were older, consistent with former findings.¹¹ In line with other studies,^{8,11,13-16} ethanol was the most frequently detected substance. Similarly, and consistent with other series,^{8,11,16} we found a high prevalence of benzodiazepines, particularly diazepam, clonazepam, alprazolam, and oxazepam—likely due to their long half-life, effects on memory, and ability to induce anterograde amnesia¹⁷—making them suitable candidates for use in CS-related crimes. The second most frequently detected substance was THC, consistent with another Spanish study,⁷ though differing from a more recent one in which it was detected in only 6.4% of victims.⁸ As in other studies,^{8,13,19} a higher prevalence of polysubstance

Table 2. Types of substances identified according to the type of crime committed

	Sexual assault N = 17 n (%)	Robbery N = 24 n (%)	No evidence of crime N = 46 n (%)	Total (N = 87) n (%)	P value
Ethanol	11 (64.7)	11 (45.8)	34 (73.9)	56 (64.4)	.075*
Benzodiazepines**	3 (17.6)	1 (4.2)	0	4 (4.6)	.056
THC	4 (23.5)	4 (16.7)	5 (10.9)	13 (14.9)	.337
Methamphetamine	1 (5.9)	2 (8.3)	0	3 (3.4)	.101
Amphetamine	2 (11.8)	2 (8.3)	0	4 (4.6)	.060
MDMA***	2 (11.8)	0	0	2 (2.3)	.036
MDA****	1 (5.9)	2 (8.7)	0	3 (3.4)	.101
Cocaine	3 (17.6)	1 (4.2)	4 (8.7)	8 (9.2)	.332
Number of substances					.006
0 or 1	8 (47.1)	18 (75)	40 (87)	66 (75.9)	
2 or more	9 (52.9)	6 (25)	6 (13)	21 (24.1)	

* $P = .015$ for the comparison between the sexual assault and robbery groups, and $P = .025$ for the comparison between the sexual assault and no-crime groups.

**Benzodiazepines detected: diazepam, clonazepam, alprazolam, and oxazepam.

***MDMA: 3,4-methylenedioxyamphetamine.

****MDA: 3,4-methylenedioxyamphetamine.

Bold values indicate statistical significance ($P < .05$).

use was observed among sexual assault victims. Although a recent review found that substances detected in CS cases are similar across countries—with ethanol, alone or in combination, and benzodiazepines predominating¹⁴—the toxicological findings vary across regions. European studies report higher ethanol detection, whereas cannabinoid prevalence is greater in the Americas,¹⁵ indicating intercultural variations in substances used. Thus, regarding scopolamine, a substance frequently detected—particularly among male robbery victims—in studies from South America¹² and only sporadically described in Spanish reports,^{8,20-22} it was not detected in our study. Moreover, in most of the cases in which scopolamine is detected, the victim is male,^{8,20-22} older, and the incident tends to be more severe.^{20,21} Another factor that may influence the type of substances detected is the population group. For example, among individuals engaging in chemsex practices, a high percentage of amphetamine derivatives has been identified,²³ making it difficult to determine whether these represent opportunistic or mixed cases of CS.

One reason for the failure to detect certain substances is the time elapsed between administration and sample collection.²⁴ In many cases, the report of the incident occurs days or even weeks after the crime, further complicating identification of the substances used and resulting in false negatives due to the rapid metabolism of many compounds^{12,24}—including scopolamine and GHB.²⁵ Therefore, it is recommended to collect not only blood samples but also urine samples, as the detection window is longer in urine. In cases where it is suspected that, due to this delay, the substances may have already been eliminated from the body and are therefore undetectable, the case is referred to as probable CS. In the present study, the percentage of confirmed CS cases was low (12%), which is consistent with

Table 3. Types of submission according to the type of crime

	Sexual assault N = 17 n (%)	Robbery N = 24 n (%)	No evidence of crime N = 46 n (%)	Total (N = 87) n (%)	P value
Confirmed CS	4 (23.5)	4 (16.7)	2 (4.3)	10 (11.4)	.056
Probable CS	5 (29.4)	13 (6.5)	3 (6.5)	21 (24.1)	<.001
Vulnerability	8 (47.1)	7 (29.2)	1 (2.2)	16 (18.4)	<.001

CS: chemical submission.

Bold values indicate statistical significance ($P < .05$).

former reports showing that few suspected cases are confirmed through urine and blood analyses.^{26,27}

Regarding the different groups, probable CS cases were more frequent among robbery victims. A possible explanation for this finding is that robbery victims tend to present to the emergency department after a longer delay following the crime. Vulnerability, which includes mixed and opportunistic CS, was more common among presumed sexual assault victims, consistent with the high rates

of self-reported voluntary consumption of ethanol or illicit drugs in CS-related sexual assault victims.^{23,28}

One limitation of the present study is its single-center design, which limits the generalizability of findings to other geographic areas, as well as the small sample size. It is also important to note that in Barcelona, cases of suspected sexual assault are referred directly to Hospital Clínic de Barcelona, whereas cases initially suspected as intoxications are managed elsewhere—another limitation of this study.

In summary, in our health care area, in most cases evaluated for suspected CS, the existence of a crime could not be demonstrated. One-quarter of cases involved CS associated with robbery, and one-fifth with sexual assault. Ethanol was the most frequently detected substance in all groups. Victims of suspected CS should seek medical attention as soon as possible to improve the reliability of toxicological detection. Similarly, emergency and prehospital professionals should remain alert to possible new forms of submission, as well as help dispel false alarms, such as needle-spiking.²⁹

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REFERENCES

- Cruz-Landeira A, Quintela-Jorge Ó, López-Rivadulla M. Sumisión química: epidemiología y claves para su diagnóstico. *Med Clin (Barc)*. 2008;131:783-9.
- Soumission chimique. Résultats de l'enquête nationale 2007. Paris: Agence Française de Sécurité Sanitaire des Produits de Santé; 2008. (Consultado 1 Septiembre 2024). Disponible en: <chrome-extension://efaidnbmn-nibpcajpcglclefindmkaj/https://ansm.sante.fr/uploads/2021/03/26/20210325-sc-resultats-enquete-2007.pdf>
- Burillo-Putze G, López Hernández A, Expósito-Rodríguez M, Dueñas-Laita A. Sumisión química, oportunista o premeditada. *Med Clin (Barc)*. 2013;140:139.
- Becerra-García JA. Epidemiología de la sumisión química con fines sexuales. *Med Clin (Barc)*. 2015;144:401-2.
- Xifró A, Barbería E, Pujol A, Arroyo A, Bertomeu A, Montero F. Sumisión química: guía de actuación médico-forense. *Rev Esp Med Legal*. 2013;39:32-6.
- Xifró-Collsamata A, Pujol-Robinat A, Barbería-Marcalain E, Arroyo-Fernández A, Bertomeu-Ruiz A, Montero-Núñez F, et al. Estudio prospectivo de la sumisión química con finalidad sexual en Barcelona. *Med Clin (Barc)*. 2015;144:403-9.

- Navarro Escayola E, Vega Vega C. Agresiones sexuales facilitadas por sustancias psicoactivas, detectadas en el Instituto de Medicina Legal de Alicante en el cuatrienio 2009-2012. *Gac Int Cienc Forense*. 2013;8:15.
- Fernández Alonso C, Vargas Lobé S, Fernández García L, Fuentes Ferrer M, Quintela Jorge Ó, Bravo Serrano B, et al. Atención de pacientes con sospecha de sumisión química en un servicio de urgencias hospitalario y resultados del análisis toxicológico. *Emergencias*. 2024;36:249-56.
- Olesti E, Pascual JA, Ventura M, Papaseit E, Farré M, de la Torre R, et al. LC-MS/MS method for the quantification of new psychoactive substances and evaluation of their urinary detection in humans for doping control analysis. *Drug Test Anal*. 2020;12:785-97.
- Pérez-Mañá C, Farré M, Pastor A, Fonseca F, Torrens M, Menoyo E, et al. Non-linear formation of EtG and FAEs after controlled administration of low to moderate doses of ethanol. *Alcohol Alcohol*. 2017;52:587-94.
- Bertomeu-Ruiz A, Arroyo-Fernández A, Pujol-Robinat A, Xifró-Collsamata A. Sumisión química y robos en serie. *Rev Esp Med Legal*. 2013;39:40-1.
- Uribe M, Moreno C, Zamora A, Acosta P. Perfil epidemiológico de la intoxicación con burundanga en la clínica Uribe Cualla S.A. de Bogotá, D.C. *Acta Neurol Colomb*. 2005;19:201.
- Carfora A, Campobasso CP, Cassandro P, Petrella R, Borriello R. Long-term detection in hair of zolpidem, oxazepam and flunitrazepam in a case of Drug-Facilitated Sexual Assault. *J Anal Toxicol*. 2022;46:e16-20.
- Skov K, Johansen SS, Linnet K, Nielsen MKK. A review on the forensic toxicology of global drug-facilitated sexual assaults. *Eur Rev Med Pharmacol Sci*. 2022;26:183-97.
- García MG, Pérez-Cárceles MD, Osuna E, Legaz I. Drug-facilitated sexual assault and other crimes: A systematic review by countries. *J Forensic Legal Med*. 2021;79:102151.
- Tiemensma M, Davies B. Investigating drug-facilitated sexual assault at a dedicated

forensic centre in Cape Town, South Africa. *Forensic Sci Int*. 2018;288:115-22.

- Kaplan K, Hunsberger HC. Benzodiazepine-induced anterograde amnesia: detrimental side effect to novel study tool. *Front Pharmacol*. 14:1257030. doi: 10.3389/fphar.2023.1257030.
- Birkler RID, Telving R, Ingemann-Hansen O, Charles AV, Johannsen M, Andreassen MF. Screening analysis for medicinal drugs and drugs of abuse in whole blood using ultra-performance liquid chromatography time-of-flight mass spectrometry (UPLC-TOF-MS)--toxicological findings in cases of alleged sexual assault. *Forensic Sci Int*. 2012;222:154-61.
- Basile KC, Smith SG, Liu Y, Lowe A, Gilmore AK, Khawaja S, et al. Victim and perpetrator characteristics in alcohol/drug-involved sexual violence victimization in the U.S. *Drug Alcohol Depend*. 2021;226:108839.
- Gomilla Muñoz I, Puiguirguer Ferrando J, Quesada Redondo L. Primera confirmación en España del uso de la burundanga en una sumisión química atendida en urgencias. *Med Clin (Barc)*. 2026;147:421.
- Frías I, Quintela O, Menéndez LM, Hernández FJ, Cuellas JA. Intoxicación y fallecimiento por escopolamina. Dos casos de sumisión química. *Rev Toxicol*. 2017;34:25.
- Elena-González A, Goicoechea-Mateo A, Gimeno-Villa AC, Fernández-Calleja G, Vieira-Lista E. Sumisión química con escopolamina, a propósito de un brote de tres casos. *Rev Toxicol*. 2020;37:98-100.
- Fernández Alonso C, Quintela Jorge O, Ayuso Tejedor S, Santiago-Sáez AE, González Armengol JJ. Intoxicación aguda por nuevas drogas de abuso en probables casos de sumisión química oportunista y/o mixta y chemsex en pacientes VIH atendidos en urgencias. *Emergencias*. 2019;31:289-90.
- Fernández Alonso C, Quintela Jorge O, Bravo Serrano B, Santiago-Sáez AE. La importancia del factor tiempo en el análisis toxicológico de casos de sumisión química en un servicio de urgencias hospitalario. *Emergencias*. 2019;31:64-7.
- Thompson KM. Beyond rooftops: Drug- and alcohol-facilitated sexual assault. *JAAPA*. 2021;34:45-9.
- Cannon LM, Bailey JM, Ernst SD, Bevilacqua

- KG, Adams C, Sheridan-Fulton E, et al. A retrospective descriptive analysis of sexual assault nurse examiner records from sexual assault survivors at a large university emergency department from 2003 to 2017. *Violence Vict.* 2021;36:66-91.
- 27 Carter LP. Potential impact of drug effects, availability, pharmacokinetics, and screening on estimates of drugs implicated in cases of assault. *Drug Test Anal.* 2011;3:586-93.
- 28 García Caballero C, Cruz-Landeira A, Quintela Jorge Ó. Sumisión química en casos de presuntos delitos contra la libertad sexual analizados en el Instituto Nacional de Toxicología y Ciencias Forenses (Departamento de Madrid) durante los años 2010, 2011 y 2012. *Rev Esp Med Legal.* 2014;40:11-8.
- 29 Burillo-Putze G, Salgado E, Suero C, Santiago I, Galicia M, Díaz-Concepción A, et al A. El fenómeno de los pinchazos y la sumisión química. *Rev Esp Urg Emerg.* 2022;1:104-7.