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### ORIGINAL ARTICLE

## Chemical submission. Evaluation of the level of knowledge of health workers<sup>☆</sup>



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#### KEYWORDS

Chemical submission;  
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#### Abstract

**Introduction:** Chemical submission is a phenomenon that has become increasingly important in recent years and doctors who care for a victim should have enough knowledge about it. Our objective is to determine the degree of knowledge of doctors who, in their professional condition, could assist to a chemical submission victim.

**Material and methods:** We have carried out a survey among health workers who can assist to a chemical submission victim in order to determine their level of knowledge in this matter.

**Results:** The results show that doctors think they don't have enough knowledge about chemical submission.

**Conclusions:** Specific training programs in chemical submission should be implemented.

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#### PALABRAS CLAVE

Sumisión química;  
Asistencia sanitaria;  
Drogas;  
Alcohol;  
Violencia sexual

#### Sumisión química. Evaluación del grado de conocimiento de los profesionales sanitarios

#### Resumen

**Introducción:** La sumisión química es un fenómeno que en los últimos años ha tenido una creciente importancia y sobre el que los médicos que atienden a las víctimas deberían tener suficientes conocimientos. Nuestro objetivo es determinar el grado de conocimiento que se tiene por parte de médicos que, en el ejercicio de su trabajo, pueden atender a una víctima de sumisión química.

**Material y método:** Se ha realizado una encuesta entre profesionales sanitarios que pueden atender a víctimas de sumisión química a fin de determinar su nivel de conocimiento en esta materia.

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**Resultados:** Los resultados muestran que los médicos consideran que no tienen suficientes conocimientos sobre sumisión química.

**Conclusiones:** Deben implementarse programas de formación específica en sumisión química.

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## Introduction

When we talk about chemical submission, we refer to those cases in which psychoactive substances are given to a person without their consent and without their knowledge, for criminal purposes. The term *chemical submission* is taken from the French *soumission chimique* and can include all kinds of crimes associated with this practice, although it is mostly linked to those of a sexual nature. For this reason, in 2007 the British expert public body, the Advisory Council on the Misuse of Drugs, adopted the definition of drug-facilitated sexual assault, used by English-speaking countries, as the acronym DFSA.

It is essential to distinguish between chemical vulnerability, when the victim has voluntarily consumed some type of psychoactive substance that alters their awareness and chemical submission itself, when the substance is given by a third party, involuntarily, and with the aim of affecting the victim's mental capacities.<sup>1</sup>

In recent years, and especially since the 1990s, crimes of a sexual nature in which the victim is under the influence of psychoactive substances have become increasingly significant, and since then numerous scientific studies, case studies, drafting of health or forensic guides and protocols for action in these situations, have been undertaken, and legal measures have also been promoted.<sup>2–11</sup>

The work carried out in this country on this subject is relatively recent and yields similar results to those of other countries.<sup>12</sup>

Establishing the level of knowledge of health care professionals is the first step in implementing the necessary training for them, as well as taking other measures in the field of prevention, such as promoting information campaigns, education plans, or guides for girls and young women, such as some that already exist.<sup>13</sup>

Any doctor who assists victims of sexual violence must have sufficient training to detect and diagnose a case of chemical submission. To do this, it is essential to establish:

1. The symptoms of suspected chemical submission. Although each substance can cause specific symptoms, a series of symptoms has been described that should lead us to think that the victim may be under the influence of a chemical substance, alcohol, drugs of abuse or medications.<sup>14</sup>
2. Substances that can cause this and the most common effects. The number of substances used, contrary to popular belief, is very large. In most cases, benzodiazepines, alcohol, GHB (gamma-hydroxybutyric acid), cannabis and cocaine have all been detected. A high percentage of victims admit to having previously

voluntarily consumed alcohol (which is also the most frequently detected) or other substances, the most frequent of which are *cannabis* and cocaine.<sup>15–25</sup> Despite the diversity of substances used, they all have some common characteristics.<sup>26</sup>

3. The most suitable samples for diagnosis. In order, these would be urine, blood and hair. Other samples can be considered depending on the particular case, such as a suspicious drink or food, syringes, full or empty sachets for a small dose of drugs, stained clothes or traces of vomit.<sup>11</sup>
4. Differential diagnosis. Since most of these are central nervous system depressants, it will be with these conditions that the differential diagnosis is proposed.

This research aimed to obtain information on the degree of knowledge of health care professionals who treat possible victims of chemical submission, almost always related to sexual violence, but which may also be associated with other crimes or personal behaviour.

## Methodology

The research carried out is based on a quantitative approach that detected causal relationships between different variables through the completion of a questionnaire to facilitate the collection of substantial information for subsequent analysis.

For the data collection process, a specific questionnaire had been developed through the Google forms resource accessible from the following link: [https://docs.google.com/forms/d/e/1FAIpQLSscv\\_vBpljpcNtamPmxSFywD7vzZARwmUF1CErMONEPw19MOW/viewform?vc=0&c=0&w=1&flr=0](https://docs.google.com/forms/d/e/1FAIpQLSscv_vBpljpcNtamPmxSFywD7vzZARwmUF1CErMONEPw19MOW/viewform?vc=0&c=0&w=1&flr=0).

This questionnaire was composed of 3 sections, the first with sociodemographic data, the second on the degree of professional scientific knowledge of chemical submission and the third on personal experience and chemical submission. Table 1 shows the questions in the questionnaire and the answer options.

The study was run by distributing the survey out to doctors through WhatsApp groups and email. Since no patient data was used, no prior assessment was requested by the ethics committee. Initially, doctors were sent out from the province of Malaga, from both hospital and out-of-hospital settings, who could attend to possible victims of chemical submission in the course of their professional work. Some of these doctors, in turn, requested that the authors send out the questionnaire to other doctors in different provinces who also treated these victims, and the answer was in the affirmative, so the questionnaire was sent out to doctors in Andalusia and other autonomous communities. The completion of the form was

**Table 1** Questionnaire and response options.

Question	Answer
<i>Sociodemographic data</i>	
Age (years)	a) 25–30 b) 31–35 c) 36–45 d) 46–55 e) More than 55
Gender	a) Man b) Women
Marital status	a) Single with a partner b) Single without a partner c) Married d) Divorced
Nationality	a) Spanish b) Other Community c) Other non-Community
Length of service (years)	a) Less than 5 b) 6–10 c) More than 10
<i>Degree of scientific-professional knowledge of chemical submission</i>	
How much do you think you know about CS?	a) Nothing b) Little c) Quite a lot d) A lot
Have you received specific training on CS to do your work?	a) Yes b) No
Do you think you are qualified to detect a case of CS?	a) Yes b) It depends c) No
It is called CS only when it is associated with crimes of a sexual nature	a) True b) False c) It depends on the route of administration
CS is applicable only if the substance has been administered by third parties	a) True b) False c) It depends on the route of administration of the substance
Which substances can produce CS?	a) Any psychoactive substance b) Only drugs of abuse c) Only drugs associated with alcoholic beverages
What substance is most often detected in cases of CS?	a) Stimulant drugs b) Sedative drugs c) Alcohol d) Antidepressants
What symptom is most suspect in relation to CS?	a) Sleep b) Amnesia c) Headache d) Sweating
Which other conditions can the clinical picture of CS be confused with?	a) Drunkenness b) TBI c) Stroke d) All
Which is the most useful sample for the chemical-toxicological detection of CS?	a) Urine b) Blood c) Saliva d) Hair
Which route of administration is the easiest and most common?	a) IV b) IM c) Nasal d) Oral

**Table 1** (*continued*)

Question	Answer
In crimes of a sexual nature associated with CS, they are more affected	a) Women b) Men c) Both equally
<i>Personal Experience and Chemical Submission</i>	
In your profession, have you attended to any victims of CS?	a) Yes b) No
How long was it?	a) Less than 1 year b) 1–2 years c) 2–3 years d) More than 3 years
Have you personally experienced an CS situation?	a) Yes b) No
Have you witnessed any cases of CS?	a) Yes b) No
Do you know of a case suffered by a person close to you?	a) Yes b) No
How often do you go out for fun or with friends?	a) I don't go out with friends b) Occasionally c) Every weekend
What is your alcohol consumption?	a) I do not consume alcoholic beverages b) Only low-proof beverages c) Distilled beverages d) Both
What is your perception of the information about CS in the press?	a) The data are alarming b) I do not give any credibility to this information

S: stroke; IM: intramuscular; IV: intravenous; CS: chemical submission; TBI: traumatic brain injury.

anonymous, in order to avoid the recipients refusing to respond if their identities were known. This also meant that the data had already been anonymised. All responses received were included in the study. The data were exported from the Google form in Excel format to the SPSS version 21 statistical software for its analysis.

## Results

A total of 442 doctors participated in the study. The socio-demographic profile of the people who responded to the survey was as follows: by gender, 62.4% of the responses corresponded to women and 37.3% were men, with 0.2% who did not answer this question. Regarding age, this was 39.4% over 55 years old, with the lowest percentage of responses in the age group between 25 and 30 years old (6.8%). The marital status was mostly married, at 67.4%. The nationality was mostly Spanish: 98.2%.

Since the survey was aimed at health care professionals, it asked about seniority in their job, as a variable. In this case, 73.5% had been in their job for more than 10 years and 20.1% for less than 5 years.

The results of the second block of the questionnaire, referring to the degree of knowledge of chemical submission, are shown in Table 2.

Finally, in the third block of questions, 54.6% answered that they had never attended professionally to a victim of chemical submission. In those who had attended to one, 25.1% had done so less than a year previously. Only 2.9% of those surveyed admitted to having had a personal

experience of chemical submission; of these, 3.62% were women and 1.81% men. A total of 93% responded that they had not witnessed any cases of chemical submission. Similarly, 86.9% did not know of any case of chemical submission in their immediate environment. The majority of respondents (82.4%) recognised the occasional frequency of going out at night. A total of 49.8% consumed low-proof alcoholic beverages. It should be noted that 23.3% did not consume any alcohol. Regarding the personal perception of the problem, 64.9% considered that the data was alarming and 33.5% did not give any credibility to the information published in the press.

Table 3 indicates the most effective route of administration for substances that produce chemical submission, according to years of seniority in their job. Finally, Table 4 shows which sample was considered most useful for detecting these substances, depending on the length of time in the job.

## Discussion

With regard to the result of the survey based on the aforementioned questionnaire, some socio-demographic aspects should be highlighted regarding the participants and, above all, the results that refer to professional knowledge of chemical submission. Although the survey did not distinguish between specific areas of work, assuming that all respondents were doctors, we should note that those who mostly responded were women over 55 years of age and with more than 10 years of professional experience. It is

**Table 2** Knowledge of chemical submission.

Question	Answer	%
How much do you think you know about CS?	Nothing	6.4
	Little	57.5
	Quite a lot	29.5
	A lot	6.4
Have you received any specific training on CS to do your work?	Yes	30.8
	No	69.0
Do you think you are qualified to detect a case of CS?	Yes	29.6
	It depends	47.1
	No	23.1
It is called CS only when it is associated with crimes of a sexual nature.	True	13.6
	False	82.6
	It depends on the route of administration	3.4
CS is applicable only if the substance has been administered by third parties.	True	49.3
	False	45.5
	It depends on the route of administration of the substance	4.8
Which substances can produce CS?	Any psychoactive substance	93.9
	Only drugs of abuse	3.6
	Only drugs associated with alcoholic beverages	1.8
Which substance is most often detected in cases of CS?	Stimulant drugs	3.2
	Sedative drugs	61.5
	Alcohol	33.5
	Antidepressants	0.9
Which symptom is most suspicious of CS?	Dreaming	13.1
	Amnesia	84.2
	Headache	0.9
	Sweating	1.4
Which other conditions can the CS clinical symptoms be confused with?	Drunkenness	27.0
	Traumatic brain injury	0.7
	Stroke	0.5
	All	71.4
Which is the most useful sample for the chemical and toxicological detection of CS?	Urine	28.5
	Blood	61.1
	Saliva	2.0
	Hair	7.0
Which route of administration is the easiest and most common?	IV	0.5
	IN	1.6
	Nasal	0.7
	Oral	97.1
In crimes of a sexual nature associated with CS, they are more affected.	Women	98.0
	Men	0.5
	Both equally	1.6

S: stroke; IM: intramuscular; IV: intravenous; CS: Chemical submission; TBI: traumatic brain injury.

striking that, regardless of their seniority in the job, more than half admitted to having little knowledge of this subject, this being found more frequently in women respondents. This finding coincides with the literature consulted, despite the scarcity of studies in this regard, which show that 86% of emergency department heads in Galician hospitals considered that the training of health care professionals in these services is scanty or non-existent.<sup>27</sup>

It is noteworthy that almost half of those who responded (49.3%) considered that chemical submission only applied if the substance was administered by a third party, and this occurred more frequently in the case of women (52.53%, compared to 44.24% for men). However, it was women who

responded more frequently (69.02% compared to 57.57% of men) that the data on the problem were alarming.

It is important to note that most respondents thought that sedative drugs were the most frequently detected substance, and only 33.5% considered alcohol to be the most often found, when this substance was present in most cases of chemical submission.<sup>15–24</sup>

It was also significant that those who had been working for more than 10 years indicated, contrary to what one might expect, other routes of administration of the substance as the most appropriate ones, rather than orally, while all those who had been working for less than 10 years indicated that the most effective route was oral.

**Table 3** The most effective route of administration according to seniority in the job.

	No answer %	IV %	IM %	Nasal %	Oral %
<i>No answer</i>	0.0	0.0	0.0	0.0	100.0
<i>Less than 5 years</i>	0.0	0.0	0.0	0.0	100.0
<i>6–10 years</i>	0.0	0.0	0.0	0.0	100.0
<i>More than 10 years</i>	0.31	0.62	2.15	0.92	96.0

IM: intramuscular; IV: intravenous.

In the same direction, those who had been in the job for more than 10 years mistakenly considered that blood was the most suitable sample for detection and moreover, they were also the group that considered a urine sample to be least suitable. Hair samples, the usefulness of which is controversial from a medicolegal point of view, were also attributed with little usefulness from the clinical perspective. Saliva samples, which are of very little use in toxicological investigations, were referred to by a small percentage of respondents as the most suitable method of detection.

Men were the group who responded that they had greater knowledge, training and ability to detect chemical submission, as opposed to women, who considered this phenomenon more alarming. Paradoxically, both groups mostly considered that chemical submission only applied if the substance was administered by a third party. Although 71.3% responded that chemical submission could be confused with other conditions such as drunkenness, traumatic brain injury or stroke, the experience of forensic doctors who are called to carry out the medicolegal assessment of the victim, when requested to do so by the court authorities, was that the initial suspicion in the case of a woman brought to the emergency room with low-level consciousness, who could not provide a medical history, was always chemical submission, without considering any other differential diagnoses. This may be due to an availability bias caused by the overexposure of the phenomenon in the media,<sup>28</sup> with information that often does not faithfully reflect reality. This can lead to diagnostic errors that can have serious repercussions on women's health.

Only a small percentage reported having witnessed or experienced a situation of chemical submission, despite this being a social and media phenomenon of high relevance, with no difference in terms of gender and age.

In practice, among the victims of chemical submission, males represent merely a reference point, and when they experience this phenomenon it is usually due to robbery and not sexual crimes,<sup>29</sup> so it is curious to note that, among those who responded to the survey, only 3 male doctors

(1.81% of all men surveyed) reported having been victims of chemical submission. In relation to female doctors, 10 reported having been victims of chemical submission (3.62% of all women surveyed). Despite being a low percentage, it can be considered that people who should have greater knowledge of this phenomenon due to their profession, may also be victims of this.

In all chemical submission studies, the substance most frequently detected was alcohol and the victim was a woman. However, in our study, more than 50% of the women who responded considered that chemical submission was only applicable when the substance was administered by third parties, ruling out the possibility that, by ingesting this of their own volition, they did not put themselves at risk or become vulnerable as individuals. This contrasts with the result obtained by Arredondo,<sup>30</sup> in which 82.2% of young women in a general population considered that abusive alcohol intake (drunkenness) was a determining factor in considering the situation of chemical submission.

Although there are multiple publications, both national and foreign, on other aspects of chemical submission, we have not found any studies similar to ours with which to compare the results we obtained. The large number of protocols for action in the event of suspicion of chemical submission that have been published by various hospitals, by the health authorities and by the Ministry of Justice, has not translated into a greater knowledge of the phenomenon on the part of the doctors who are the first to have to attend to the victims.

Although, due to the anonymity of the survey, we do not know the workplace of each professional who has responded, the questionnaire has been widely distributed and has not focussed on one single Spanish province or autonomous community, for which reason we think that this situation of little knowledge on the part of doctors is quite widespread. However, not knowing the location where the doctors who have responded to the survey do their work, means that we cannot reliably determine whether this lack of knowledge they report is something general that occurs in any area and health care environment (hospital/

**Table 4** Most useful sample based on seniority in the job.

	No answer %	Urine %	Blood %	Saliva %	Hair %
<i>No answer</i>	0.0	50.0	50.0	0.0	0.0
<i>Less than 5 years</i>	1.12	38.2	49.44	2.25	8.99
<i>6–10 years</i>	0.0	38.46	46.15	3.85	11.54
<i>More than 10 years</i>	1.54	24.92	65.54	1.85	6.15



out-of-hospital) or if this only occurs in certain areas and/or health care environments; a fact which is a limitation to our study.

## Conclusions

This study was centred up on determining the degree of knowledge that doctors have when treating possible cases of chemical submission that occur in their professional work. It is clear that chemical submission is a phenomenon of great social alarm, increasingly well-known and with greater media projection in recent times. However, the response of these health care professionals to our survey is that they have little or insufficient knowledge on the subject, regardless of their gender.

Based on the responses, it is evident that doctors receive little or no training in this regard, which leads us to consider the need to implement specific training programmes and apply specific protocols of action for these situations. This is the first step in detecting cases quickly, providing quality care to victims and avoiding secondary victimisation.

Alcohol is the substance most frequently detected in chemical and toxicological analyses in cases of chemical submission, and it continues to enjoy great social acceptance. Moreover, a significant proportion of the doctors who responded to our survey were found not to consider that its consumption may constitute a risk of being a victim of chemical submission.

It is also significant that the responses obtained do not indicate any major differences in terms of lack of knowledge in relation to the respondent's gender.

The majority perception of those who answered this survey - that they had little or no knowledge of chemical submission - was not disproved in our study. The main conclusion can be considered to be that the lack of knowledge on the subject is the most relevant feature of the result of this analysis and that specialised training in this area for the population of health care practitioners is clearly needed.

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## Conflict of interest

The authors declare that they have no conflict of interest.

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## References

- García Repetto R, Soria ML. Sumisión química: reto para el toxicólogo forense. *Rev Esp Med Legal*. 2011;37:105–12.
- Abordaje integral de víctimas de sumisión química y/o agresión por objeto punzante. Consejería de Salud y Consumo. Junta de Andalucía. Available in [https://web.sas.junta-andalucia.es/servicioandaluzdesalud/sites/default/files/sincfiles/wsas-media-mediafile\\_sasdocumento/2023/protocolo\\_sq\\_2023.pdf](https://web.sas.junta-andalucia.es/servicioandaluzdesalud/sites/default/files/sincfiles/wsas-media-mediafile_sasdocumento/2023/protocolo_sq_2023.pdf)
- Protocolo de actuación del personal sanitario, ante la sospecha de sumisión química. Conselleria de Sanitat Universal i Salut Pública. Generalitat Valenciana; 2022. Available in [https://www.san.gva.es/documents/337762/3024897/prot\\_ante\\_sospecha\\_sumision\\_quimica\\_es.pdf/74e47872-c599-0776-ad46-39d81164b529?t=1,675,939,616,180](https://www.san.gva.es/documents/337762/3024897/prot_ante_sospecha_sumision_quimica_es.pdf/74e47872-c599-0776-ad46-39d81164b529?t=1,675,939,616,180).
- Protocolo para la atención sanitaria ante la sospecha de sumisión química en Castilla y León. Dirección general de asistencia sanitaria y humanización. Consejería de Sanidad de Castilla y León; 2022. Available in: <https://www.saludcastillayleon.es/profesionales/fr/violencia-genero/protocolo-atencion-sanitaria-sospecha-sumision-quimica.fichiers/2231253-PROTOCOLO%20ATENCION%20C3%93N%20SANITARIA%20ANTE%20SOSPECHA%20DE%20SUMISION%20C3%93N%20QUIMICA%20EN%20CASTILLA%20Y%20LEON%20C3%93N.pdf>.
- Protocolo de asistencia a víctimas de sospecha de sumisión química y/o agresión a través de pinchazo. Servicio de Salud de Castilla-La Mancha. Available in [https://institutomujer.castillalamancha.es/sites/institutomujer.castillalamancha.es/files/campañas/dgcc-pc-01\\_protocolo\\_actuacion\\_victimas\\_sospecha\\_sumision\\_quimica\\_y-o\\_agresion\\_a\\_traves\\_de\\_pinchazo\\_.pdf](https://institutomujer.castillalamancha.es/sites/institutomujer.castillalamancha.es/files/campañas/dgcc-pc-01_protocolo_actuacion_victimas_sospecha_sumision_quimica_y-o_agresion_a_traves_de_pinchazo_.pdf)
- Protocolo de atención sanitaria a víctimas de agresiones/abusos sexuales. Consejería de Sanidad. Gobierno de Cantabria; 2017. Available in: <https://saludcantabria.es/uploads/pdf/profesionales/ProtocoloAgresionesSexuales.pdf>.
- Protocolo de actuación ante sospecha de sumisión química. Servicio Madrileño de Salud. Dirección general de coordinación de la asistencia sanitaria; 2018. Available in: <https://gdtmujersomamfyc.wordpress.com/wp-content/uploads/2021/07/wp-1,625,481,838,136.pdf>.
- Carrero Fernández AM, Martínez Villena B, Espada Zurera M, Troncoso Viejo D. Protocolo de actuación y manejo del paciente sospechoso de sumisión química en los Servicios de Urgencias. *Medicine*. 2019;12(90):5316–9.
- Guía de buenas prácticas para la actuación forense ante la víctima de un delito facilitado por sustancias psicoactivas: intervención ante la sospecha de sumisión química. Ministerio de Justicia; 2022.
- Xifro 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.
- Guidelines for the forensic analysis of drugs facilitating sexual assault and other criminal acts. United Nations Office on Drugs and Crime (UNODC). Nueva York: Naciones Unidas; 2013. Available in: [https://www.unodc.org/documents/scientific/Rape\\_Drugs\\_Spanish.pdf](https://www.unodc.org/documents/scientific/Rape_Drugs_Spanish.pdf).
- Isorna M, Rial A. Drogas facilitadoras del asalto sexual y sumisión química. *Health and Addictions*. 2015;15:137–50.
- López Hidalgo E. Sumisión química. Guía informativa para adolescentes y jóvenes. *Cuad Med Forense*. 2018;24(1–2):23–6.
- Du Mont J, Macdonal S, Rotbard N, Aslani E, Bainbridge D, Cohen MM. Factors associated with suspected drug-facilitated sexual assault. *CMAJ*. 2009;180:513–9.
- García Caballero C, Cruz Landeira A, Quintela Jorge O. Sumisión química en casos de presuntos delitos contra la libertad sexual analizados en el INT y CCFF (Departamento de Madrid) durante los años 2010, 2011 y 2012. *Rev Esp Med Legal*. 2014;40:11–8.
- McBrierty D, Wilkinson A, Tormey W. A review of drug-facilitated sexual assault evidence: an Irish perspective. *J Forensic Leg Med*. 2013;20:189–97.
- Anderson LJ, Flynn A, Pilgrim JL. A global epidemiological perspective on the toxicology of drug-facilitated sexual assault: a systematic review. *J Forensic Leg Med*. 2017;47:46–54.

18. García MG, Pérez-Cárceles MD, Osuna E, Legaz I. Drug-facilitated sexual assault and other crimes: a systematic review by countries. *J Forensic Leg Med.* 2021;79, 102151.
19. Fiorentin TR, Logan BK. Toxicological findings in 1000 cases of suspected drug facilitated sexual assault in the United States. *J Forensic Leg Med.* 2019;61:56–64.
20. Skov K, Johansen SS, Linnet K, Nielsen MKK. Uncovering forensic evidence of drug-facilitated sexual assault: toxicological findings from Eastern Denmark from 2015–2022. *Leg Med.* 2023;65, 102325.
21. Scott-Ham M, Burton FC. Toxicological findings in cases of alleged drug-facilitated sexual assault in the United Kingdom over a 3-year period. *J Forensic Leg Med.* 2005;12:175–86.
22. García-Repetto R, Soria ML. Consideraciones toxicológicas sobre supuestos casos de sumisión química en delitos de índole sexual en el sur de España entre los años 2010–2012. *Rev Esp Med Legal.* 2014;40:4–10.
23. Xifró-Collsamata A, Pujol-Robinat A, Barbería-Marcailain 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.* 2015;144:403–9.
24. Skow 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.
25. Fernández Alonso C, Quintela Jorge O, Bravo Serrano B, Santiago-Sáez AE. La importancia del factor tiempo en el análisis toxicológico de casos de sospecha de sumisión química en un servicio de urgencias hospitalario. *Emergencias.* 2019;31: 64–7.
26. Cruz-Landeira A, Quintela-Jorge O, López-Rivadulla M. Sumisión química: epidemiología y claves para su diagnóstico. *Med Clin (Barc).* 2008;131:783–9.
27. Santiago Rivas D. Sumisión química en urgencias: situación actual y protocolo asistencial. Universidad de Santiago de Compostela; 2022. Available in: [https://minerva.usc.es/xmlui/bitstream/handle/10347/29853/2022\\_tfg\\_medicina\\_santiago\\_sumision.pdf?sequence=1](https://minerva.usc.es/xmlui/bitstream/handle/10347/29853/2022_tfg_medicina_santiago_sumision.pdf?sequence=1).
28. Schmidt HG, Mamede S, van den Berge K, van Gog T, van Saase JLCM, Rikers RMJP. Exposure to media information about a disease can cause doctors to misdiagnose similar-looking clinical cases. *Acad Med.* 2014;89(2):285–91.
29. Ramadan ASE, Wenanu O, Cock ADE, Maes V, Lheureux P, Mols P. Chemical submission to commit robbery: a series of involuntary intoxications with flunitrazepam in Asian travelers in Brussels. *J Forensic Legal Med.* 2013;20:918–21.
30. Arredondo Quijada R. Ocio nocturno: sumisión química y agresiones sexuales. *Revista Trabajo Soc UNAM.* 2022;31: 142–56.