

## REFERENCES

- Ernst E, De Smet PAGM. Risks associated with complementary therapies. In: *Meyler's side effects of drugs*. 13th edn. St Louis: Elsevier Science, 1996.
- Shawcross WE. Recreational use of ergoline alkaloids from *Argyria nervosa*. *J Psychoactive Drugs* 1983;15:251-9.
- Eileen, Richard. Letter to the editor. *High Times* 10 Jan, 1977.
- Dowling EA, Redondo DR, Branch JD, et al. Effect of *Eleutherococcus senticosus* on sub-maximal and maximal exercise performance. *Med Sci Sports Exercise* 1996;28:482-9.
- Wexler P. *Encyclopaedia of toxicology*. St Louis: Academic Press, 1998.
- Myerscough H. Herbal remedies: How much do we know? *Aust Fam Physician* 1998;27:1037-40.
- Olin BR. *Lawrence review of natural products, facts and comparisons*. St Louis: Nov 1996.
- Pepping J. Kava: Piper methysticum. *Am J Health Syst Pharm* 1999;56:957-60.
- Munte TF, Heinze HJ, Matzke MA, et al. Effects of oxazepam and an extract of kava roots (Piper methysticum) on event-related potentials in a word recognition task. *Neuropsychobiology* 1993;27:46-53.
- Tonks A. Treating generalised anxiety disorder. *BMJ* 2003;326:700-2.
- Gunatilaka AAL, Arsecularatne SN, Panabokke RG, et al. Studies on medicinal plants of Sri Lanka. *Planta Medica* 1980;39:66-72.
- Kanth VR, Diwan PV. Analgesic, antiinflammatory and hypoglycaemic activities of *Sida cordifolia*. *Phytotherapy Research* 1999;13:75-7.
- Zahn KA, Raymod LL, Pursell RA. Cardiovascular toxicity after ingestion of "herbal ecstasy". *J Emerg Med* 1999;17:289-91.
- Foster S. Effect of lorazepam and haloperidol for rapid tranquilization in a psychiatric emergency room setting. *International Journal of Clinical Psychopharmacology* 1997;12:175-9.

# Gamma hydroxybutyrate use for sexual assault

M Varela, S Nogué, M Orós, Ò Miró

*Emerg Med J* 2004;21:255-256. doi: 10.1136/emj.2002.002402

The use of gamma hydroxybutyrate (GHB) as a recreational drug has quickly spread among European young people during the past decade. Although it has been claimed that GHB can be potentially used to facilitate sexual assault, no case reports have been previously described. A case is described in which GHB was used with that criminal purpose and a review of previous literature is undertaken.

An estimated 20% of adult women, 15% of college aged women, and 12% of adolescent girls have experienced sexual assault or sexual abuse.<sup>1</sup> Drug facilitated sexual assault has increasingly occurred in the past few years, and gamma hydroxybutyrate (GHB), best known by the street name of "liquid ecstasy", has repeatedly been claimed as one of the most commonly used for this purpose. However, objective analytical data demonstrate that GHB is much more unusual than expected and that ethanol is by far the substance more frequently found (table 1).<sup>2,3</sup> None the less, as nothing is reported in these studies about whether drugs were voluntarily consumed by the victim or intentionally used by the perpetrator to gain his/her control, the true role for each drug in sex crimes remains to be defined.

We report a case in which GHB use as sexual assault facilitator seems to be present and we also review previous literature.

## CASE REPORT

A 20 year old woman presented herself to the emergency department suspecting that she had probably been sexually assaulted. The previous night she had been dancing in a discotheque, she had had two drinks and smoked cigarettes, but denied any illegal drug use. At this point, she had a gap in her memory. Her next memory was that she woke up in bed in a strange flat with two unknown men who took her to the street, left her, and disappeared.

She complained of mild proctalgia and vulvodynia. Her medical history was irrelevant. The patient had been sexually active from the age of 17. Physical examination was only remarkable for the presence of a recent haematoma on the inside of the right thigh. The external and internal genitalia, perineum, and anus were normal, and the hymen was broken and healed, and presence of spermatozoa in vaginal samples was confirmed by optic microscopy. Psychiatric evaluation

uncovered no psychopathological data apart from a reactive depression.

The routine screening of the urine sample (enzyme immunoassay, ACA Star) for opioids, cocaine, cannabis, amphetamines, benzodiazepines, and ethanol was negative. A further determination of GHB by gas chromatography selected ion monitoring mass spectrometry (HP5971) was requested and confirmed as positive.

## DISCUSSION

GHB was initially developed and used as an anaesthetic inductor, but its use in medicine progressively decreased because of its low analgesic properties and high incidence of secondary effects. Conversely, GHB recreational use rapidly spread to most developed countries during the past decade.<sup>4</sup> In Catalonia, despite the fact that the first cases were described during 1999,<sup>5</sup> more than 100 cases have been reported by a single institution only two years later.<sup>6</sup> Users especially appreciate its euphoric, disinhibitory, sedative and anabolic effects and some people have also mentioned aphrodisiac properties. GHB is quickly and effectively absorbed in the stomach, achieves a blood peak in few minutes, easily reaches the central nervous system, and has a short half life (27 minutes), being expelled unchanged by the kidneys. GHB is not detectable in urine after 12 hours.<sup>2</sup> The

**Table 1** Substances identified in 3212 suspected cases of drug facilitated sexual assault<sup>2,3</sup>

Number of drugs	Number of cases (% of total cases)
None	1252 (39)
One	1121 (35)
More than one	839 (26)
Kind of drug	Number of cases (% of positive cases)
Ethanol	1272 (76)
Cannabinoids	582 (28)
Benzodiazepines	372 (18)
Cocaine	263 (13)
Amphetamines	191 (9)
Opioids	116 (6)
Gamma hydroxybutyrate	105 (5)
Barbiturates	34 (2)

main clinical effect of GHB overdose is a decrease of consciousness, which is usually manifested about 15 minutes after oral administration and persists for about three hours on average. In up to 17% of patients arriving at the emergency department because of GHB overdose, a deep coma (Glasgow Consciousness Scale of 3 points) is present.<sup>6</sup>

Since GHB has been banned in most countries, consumers have increasingly changed the use of GHB by gamma butyrolactone and/or 1,4 butanediol. These industrial solvents are precursors of GHB and are comparatively easy to obtain. In fact, they can be brought via the internet. Although the relevance of this shift has not been studied in Catalonia, gamma butyrolactone and 1,4 butanediol is thought to be the cause of a significant number of GHB overdoses in many parts of the world, specially in Australia and United States.<sup>7-11</sup>

The most typical street presentation of GHB is as a colourless and odourless liquid with a very slightly salty taste; GHB can therefore be mixed with drinks with no appreciable change in their organoleptic characteristics. This, together with the pharmacokinetic and pharmacodynamic properties referred to above, makes GHB ideal for drug facilitated sexual assaults, especially when it is considered that GHB also causes passivity, loss of will to resist, relaxation of voluntary muscles, and lasting anterograde amnesia concerning events occurring under the influence of the drug. However, no individual case reports have been reported confirming this hypothesis to date. It is possible that analytical difficulties surrounding GHB determination (especially the necessity of a targeted analysis for detection because of GHB is not routinely included in current toxicological drug abuse screenings) is contributing to the lack of data regarding this issue.

The symptoms manifested by the patient in this case report are consistent with the known pharmacological effects of GHB. GHB has been shown to act synergistically with other central nervous system depressants such as ethanol. Symptoms may also mimic those of alcohol and not all

patients are screened for GHB. For all these reasons we want to emphasise the importance of GHB (and precursors) being considered with any causes of sexual assault, and should be included with any drugs of abuse screen that is done in these cases.

#### Authors' affiliations

**M Varela, Ò Miró**, Emergency Department, Hospital Clínic, Barcelona, Spain

**S Nogué**, Toxicology Unit, Hospital Clínic, Barcelona

**M Orós**, Forensic Department, Barcelona

Correspondence to: Dr Ò Miró, Emergency Department, Hospital Clínic, Villarroel 170, 08036 Barcelona, Catalonia, Spain; omiro@clinic.ub.es

Accepted for publication 17 January 2003

#### REFERENCES

- 1 **Council on Scientific Affairs, American Medical Association**. Violence against women: relevance for medical practitioners. *JAMA* 1992;**267**:3184-9.
- 2 **Elsohly MA, Salamone SJ**. Prevalence of drugs used in cases of alleged sexual assault. *J Anal Toxicol* 1999;**23**:141-6.
- 3 **Slaughter L**. Involvement of drugs in sexual assault. *J Reprod Med* 2000;**45**:425-30.
- 4 **Chin RL, Sporer KA, Cullison B, et al**. Clinical course of gamma-hydroxybutyrate overdose. *Ann Emerg Med* 1998;**31**:729-36.
- 5 **Espinosa G, Miró O, Nogué S, et al**. Intoxicación por extasis líquido: estudio de 22 casos. *Med Clin (Barc)* 2001;**117**:56-8.
- 6 **Miró O, Nogué S, Espinosa G, et al**. Trends in illicit drug emergencies: the emerging role of gamma-hydroxybutyrate. *J Toxicol Clin Toxicol* 2002;**40**:129-35.
- 7 **Zvosec DL, Smith SW, McCutcheon JR, et al**. Adverse events, including death, associated with the use of 1,4-butanediol. *N Engl J Med* 2001;**344**:87-94.
- 8 **Mason PE, Kerns WP**. Gamma-hydroxybutyric acid (GHB) intoxication. *Acad Emerg Med* 2002;**9**:730-9.
- 9 **Schwartz RH, Milteer R, Le Bean MA**. Drug-facilitated sexual assault ("date rape"). *South Med J* 2000;**93**:558-61.
- 10 **Smith KM, Larive LL, Romanelli F**. Club drugs: methyl-enedioxy-methamphetamine, flunitrazepam, ketamine hydrochloride, and gamma-hydroxybutyrate. *Am J Health Syst Pharm* 2002;**59**:1067-76.
- 11 **Caldicott DG, Kuhn M**. Gamma-hydroxybutyrate overdose and physostigmine: teaching new tricks to an old drug? *Ann Emerg Med* 2001;**37**:99-102.