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Acute poisoning with gamma-hydroxybutyrate

SHORT REPORT

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BACKGROUND

Many patients with gamma-hydroxybutyrate (GHB) poisoning are treated at the emergency primary health care (A&E clinic) level in Oslo. We describe the clinical picture of GHB poisoning and compare hospitalised patients with patients who were discharged from the main A&E clinic in Oslo.

MATERIAL AND METHOD

We registered retrospectively all patients with the clinical diagnosis GHB poisoning at the Oslo Accident and Emergency Outpatient Clinic from 1 October 2013 to 30 September 2015. We only included cases where GHB was taken as an intoxicant.

RESULTS

We found 329 cases of GHB poisoning in the period. The median age was 30 years (interquartile range 25–36 years, range 15–56 years), and 228 (69 %) of the cases were men. GHB was taken as the only intoxicant in 128 cases (39 %), combined with alcohol in 96 (29 %) and with amphetamine in 65 (20 %). Reduced level of consciousness was observed in 218 cases (69 %), coma (Glasgow Coma Scale score ≤ 7) in 43 (14 %) and agitation in 117 (36 %). Compared with patients who were discharged from the A&E clinic, the 159 hospitalised patients (48 % of the total number) were more often comatose (23 % vs 5 %, $p < 0.001$) and agitated (43 % vs 28 %, $p = 0.008$). The median observation time at the A&E clinic prior to hospitalisation was 42 minutes (interquartile range 26 min – 1 h 23 min, range 2 min – 20 h 10 min) vs 3 h 1 min (interquartile range 1 h 32 min – 4 h 42 min, range 14 min – 15 h 37 min) for those who were discharged from the A&E clinic ($p < 0.001$).

INTERPRETATION

Half of the patients with GHB poisoning were only treated at A&E clinic level. Many of those who were hospitalised had severe symptoms that quickly called for hospitalisation.

Main findings

Alternating levels of consciousness and agitation were frequent findings in patients treated for assumed GHB poisoning at the Oslo A&E clinic.

Half of the patients were sent on to hospital.

Gamma-hydroxybutyrate (GHB) and the closely related gamma-butyrolactone (GBL) and 1,4-butanediol (BD) are relatively new intoxicants in Norway. They first appeared in the 1980s (1). In 2014, 1.7 % in the age group 16–30 years reported that they had used GHB one or more times (2). At the main A&E clinic in Oslo, the number of GHB poisonings increased by 148 % from 2008 to 2012 (3). When taken as intoxicants, GHB, GBL and BD are mainly ingested orally in

liquid form (1). GBL and BD are converted into GHB in the body. GHB has a dose-dependent central nervous system depressant effect and in low doses produces euphoria, confusion, dizziness and drowsiness. The effects are felt 15–20 minutes after ingestion and last for 2–4 hours, followed by sudden awakening. The maximum effect is reached after 30–60 minutes. The steep dose-response curve means that there is only a small difference between an intoxicating dose and an overdose (4, 5).

GHB poisoning can cause respiratory depression, bradycardia, hypotension, memory loss, reduced and often alternating level of consciousness, agitation, seizures and coma. It is particularly dangerous in combination with other central nervous system depressants that have a synergistic effect with GHB (4, 5). Deaths occur (3–4 a year in Norway (6)), and are usually due to respiratory arrest.

The treatment consists of appropriate support measures with monitoring of respiration and circulation. The most important factors are a free respiratory passage and respiratory support if necessary. Agitation may lead to a need for sedation in the form of benzodiazepines, and possibly general anaesthesia and intubation. There is no antidote. Agitation is also seen in cases of abstinence, which may begin just a few hours after the last intake (5). Hospitalisation is often necessary with GHB poisoning, but in Oslo many are treated at the A&E clinic. The purpose of this study is to describe the clinical picture, treatment and some demographical data for patients who are treated for GHB poisoning at the A&E clinic, and to compare the patients who were only treated there with those who were sent on to hospital.

Material and method

The study is an observational, retrospective study. We used the registration form and the set of variables developed by the research network European Drug Emergencies Network (Euro-DEN) (7).

We included all patients treated for GHB poisoning at the Oslo Accident and Emergency Outpatient Clinic (OAEOC) from 1 October 2013 to 30 September 2015. We included only cases where GHB was taken as an intoxicant, not poisonings with suicidal intent or inflicted by others. The diagnosis of ingested intoxicants was based on the assessment recorded by the attending doctor, which in turn was based on a clinical examination and information provided by the patient and third parties. No laboratory diagnostic workup was carried out. The patients were found by means of a review of the reasons for contact registered in the patient registration lists in the A&E clinic's electronic records system.

Most patients with intoxicant poisoning in Oslo are treated at the OAEOC according to a standardised procedure with simple interventions (8). Patients who need more advanced diagnostics or treatment are sent on to hospital.

Data were collected from electronic records and from the observation form that is used for assumed intoxicant poisoning. We registered age, sex, time of admission, mode of admission, ingested intoxicants, treatment administered, observation time (from arrival until the patient left A&E) and disposition from A&E, as well as a set of clinical symptoms and findings.

The study was performed as a quality improvement project. The project was assessed by the Information Security and Privacy Office at Oslo University Hospital.

SPSS version 25 was used to perform statistical analyses. Data are presented as median, interquartile range and range. In the comparison of hospitalised and non-hospitalised patients, the chi-squared test and Fisher's exact test were used for percentages and Mann-Whitney's U-test for continuous variables.

Results

Of the in all 327 cases of GHB poisoning, 101 (31 %) were women (Table 1). The median age was 30 years (interquartile range 25–36 years, range 15–56 years).

Table 1

Poisonings with gamma-hydroxybutyrate (GHB) treated at the main A&E clinic in Oslo from 1.10.2013 to 30.9.2015. Patient characteristics, treatment and measures as number (%) unless otherwise specified.

	GHB sole agent	GHB and supplementary agent	Total
Sex			
Men	87 (68)	141 (70)	228 (69)
Women	41 (32)	60 (30)	101 (31)
Age (years), median (interquartile range)[1]	31 (27–36)	29 (25–35)	30 (25–36)
Brought by ambulance	42 (33)	107 (53)	149 (45)
Treatment other than observation only	13 (10)	29 (14)	42 (13)
Intubation	1 (1)	-	1(< 0.5)
Naloxone (opioid antidote)[2]	8 (6)	21 (10)	29 (9)
Flumazenil (antidote for benzodiazepines)[2]	-	1(< 0.5)	1(< 0.5)
Sedation[2]	3 (2)	2 (1)	5 (2)
Observation period (hours:minutes), median (interquartile range)	0:48 (0:28–2:15)	2:02 (0:57–3:56)	1:28 (0:38–3:17)
Disposition			
Hospitalised	82 (64)	78 (39)	160 (49)
Medically discharged from A&E clinic	34 (27)	96 (48)	130 (40)

	GHB sole agent	GHB and supplementary agent	Total
Left A&E clinic during treatment	12 (9)	27 (13)	39 (12)
Total	128 (100)	201 (100)	329 (100)

[1]Data not available for 19 cases

[2]Administered at A&E clinic and/or in the ambulance before arrival at A&E

In 128 cases (39 %), GHB was reported to be the sole intoxicant. In the remainder, GHB had been ingested together with one or more other intoxicants: ethanol in 96 cases (29 %), amphetamine in 65 (20 %), benzodiazepines in 49 (15 %), heroin in 46 (14 %), cannabis in 14 (4 %) and cocaine in 12 (4 %).

The most prominent clinical finding was reduced level of consciousness. 218 (69 %) scored < 15 on the Glasgow Coma Scale (GCS), and 43 (14 %) were comatose (GCS score ≤ 7), while 117 (36 %) were agitated (Table 2). Of 43 who were comatose on admission, 11 (26 %) became agitated during the course of events. The same applied to 59 of 175 patients (34 %) who had a GCS score of 8–14 on arrival.

Table 2

Clinical picture of poisonings with gamma hydroxybutyrate (GHB) treated at the main A&E clinic in Oslo from 1.10.2013 to 30.9.2015. Number (%)

	GHB sole agent	GHB and supplementary agent	Total
Level of consciousness, Glasgow Coma Scale score [1, 2]			
15	29 (25)	71 (36)	100 (31)
8–14	69 (58)	106 (53)	175 (55)
≤ 7	20 (17)	23 (12)	43 (14)
Bradypnoea (respiratory rate < 12 breaths/min)[1]	6 (5)	19 (9)	25 (8)
Tachypnoea (respiratory rate ≥ 20 breaths/min)[1]	20 (16)	37 (18)	57 (17)
Bradycardia (pulse < 50 beats/min)[1]	4 (3)	7 (3)	11 (3)
Tachycardia (pulse ≥ 100 beats/min)[1]	13 (10)	49 (24)	62 (19)
Hypotension (systolic blood pressure ≤ 90 mm Hg)	4 (3)	6 (3)	10 (3)
Hyperthermia (temperature ≥ 39 °C)	-	-	-
Vomiting	5 (4)	10 (5)	15 (5)

	GHB sole agent	GHB and supplementary agent	Total
Headache	-	6 (3)	6 (2)
Anxiety	8 (6)	13 (6)	21 (6)
Hallucinations	3 (2)	5 (2)	8 (2)
Agitation	55 (43)	62 (31)	117 (36)
Psychosis	2 (2)	3 (1)	5 (2)
Seizures	3 (2)	7 (3)	10 (3)
Total	128 (100)	201 (100)	329 (100)

[1]On admission

[2]Data not available for 11 cases, n = 118 for GHB sole agent and n = 200 for GHB and supplementary agent

The patient was admitted to a somatic hospital in 159 cases (48 %) (Table 1). The median observation time at the A&E clinic was 1 h 28 min (interquartile range 38 min – 3 h 17 min, range 2 min – 20 h 10 min). The observation time was shorter when it ended with hospitalisation: 42 min with hospitalisation (interquartile range 26 min – 1 hour 23 min, range 2 min – 20 h 10 min) vs 3 h 1 min without (interquartile range 1 h 32 min – 4 h 42 min, range 14 min – 15 h 37 min) ($p < 0.001$). Hospitalised patients more often had GCS scores ≤ 7 (23 % vs 5 %; $p < 0.001$) and were more often agitated (43 % vs 28 %; $p = 0.008$). Apart from this, the hospitalised patients did not differ from the others. No patients died at the A&E clinic.

Discussion

The sharp increase in the number of GHB poisonings treated at A&E clinic level in Oslo from 2008 to 2012 did not continue in the period of our study up to 2015 (3), but stabilised at around 150 cases per year.

As expected, reduced level of consciousness and agitation characterised the clinical picture (4, 5), and many were both comatose and agitated. Tachypnoea and tachycardia also occurred widely and are probably related to agitation or simultaneous ingestion of stimulants, for example amphetamine or cocaine. Patients with GHB poisoning are often so agitated that sedation is necessary. Because of the risk of amplifying the respiratory depressing effect of GHB, the patient is then hospitalised, so that sedation can be administered in more controlled forms than at an A&E clinic, with greater possibilities for monitoring and respiratory support. Agitation requiring sedation is thus a major reason for hospitalising patients with GHB poisoning. Coma is another, because it may be accompanied by respiratory depression, as seen in 8 %. We do not know at which point in the course of events the patients in our dataset were agitated,

only that they were, but the alternation between agitation and coma is difficult to manage at an A&E clinic. As many as half the patients with GHB poisoning were hospitalised, compared to 17 % of the patients with intoxicant poisoning generally at the OAEOC (8, 9). Several of the hospitalised patients in our dataset were neither comatose nor agitated, and it is therefore conceivable that more of them could have been treated at A&E clinic level only. However, we only have the Glasgow Coma Scale score registered on arrival, so we do not know whether the hospitalised patients had a reduced level of consciousness during the course of events. A reduced level of consciousness may be accompanied by respiratory depression, and should therefore imply hospitalisation. The further it is to the hospital, the earlier one should act.

Strengths and weaknesses

We attempted to include in our study all patients with assumed GHB poisoning treated at A&E clinic level in Oslo in a two-year period. Because of the retrospective design, there is a risk that we may have missed some, but we cannot see that this would cause systematic bias. However, the most serious GHB poisoning cases are taken directly to hospital by the ambulance service, and in 2012 there were as many of these patients as were admitted from the A&E clinic (9, 10). As the most seriously ill patients do not come to the A&E clinic, our findings do not reflect the severity of GHB poisonings overall. We believe nonetheless that our findings have clinical relevance for other A&E clinics with observation facilities and for hospital emergency departments in places where intoxicant poisoned patients are not treated at the A&E clinic level.

Laboratory analyses for detecting intoxicants were not performed. This means there is uncertainty as to which agent the patients had ingested. However, our toxic agent registration was based on the clinical assessment made there and then, and which determined the treatment received by the patient.

Our data are five years old, and the GHB user group may have changed since then. The range of additional intoxicants may also have changed.

Conclusion

Patients with assumed GHB poisoning often arrived with reduced level of consciousness and agitation. Half of the patients were sent on to hospital. Future research should look for indicators for when hospitalisation is necessary, and when it is safe to treat a patient at an A&E clinic.

The article has been peer-reviewed.

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