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Research Paper

Going knock—Recurrent comatose GHB intoxication in the Netherlands & Flanders (Belgium)

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ABSTRACT

Background: Gamma-hydroxybutyrate (GHB) overdose is an important concern in the Netherlands and Flanders, Belgium and accounts for most overdoses reported by emergency services. Few stu dies have focused on GHB overdose. Appropriate public health responses have yet to be developed. We report an explorative survey of people who use GHB and their experience with GHB overdose, aiming to identify risk and protective factors associated with comatose intoxication after GHB ingestion.

Methods: We conducted a cross-sectional survey of GHB consumers from different GHB consumption contexts. Between May and October 2014, 146 respondents were recruited in both the urban Randstad and in smaller towns in the Netherlands and Flanders, using a variety of sampling methods. Descriptive statistics were used to describe demographic, social economic, drug use, environmental variables and the experience of overdose and GHB induced coma in the resulting convenience sample. Multivariate CHAID (Chi-quadrat automatic interaction detector) was used in exploring interactions with overdose.

Results: All study respondents were poly drug consumers. We identified several factors associated with coma. The strongest relationship was found between coma and the lifetime number of GHB consumption episodes. Using alone, the number of doses per consumption episode (stacking) and the living region were strongly associated with GHB overdose as well. In the Netherlands, heavy, high risk GHB consumption is primarily found among poorly educated young adolescents in economically less privileged provincial communities.

Conclusions: We found extremely high rates of comatose intoxication after GHB use and the strongest association with GHB overdose concerned the lifetime number of GHB consumption episodes. Poly-drug consumption appears to be the norm in our entire sample, but does not necessarily distinguish heavy or high risk consumption from more recreational use. Using in the company of friends may offer some level of protection against GHB overdose. Overdose prevention, stabilizing heavy and harmful drug consumption patterns and reducing the harms associated therewith should become an important priority in the Dutch response to GHB.

Introduction

Overdose is a principal cause of death among people who use illicit drugs (Centers for Disease Control and Prevention, 2017; Davoli et al., 2007; Mathers et al., 2013), primarily affecting people who use opioids in their most productive years (Australian Bureau of Statistics, 2017; European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) (2017); Hedegaard, Warner, & Minino, 2017; Special Advisory Committee on the Epidemic of Opioid Overdoses, 2017). Most of these preventable deaths are attributed to opioids, illegal or prescribed, but a substantial part of reported overdose deaths concerns or includes benzodiazepines or other non-opioid drugs. Often several substances are implicated (Centers for Disease Control and Prevention, 2017; European Monitoring Centre on Drugs and Drug Addiction, 2015).

GHB, a drug with unpredictable overdose potential

Belgium, The Czech Republic, the Netherlands and the United Kingdom, as well as the USA have recently seen increases in the use of Gamma-hydroxybutyrate or GHB (European Monitoring Centre for Drugs and Drug Addiction, 2011; Palamar, Martins, Su, & Ompad, 2015; Wu, Schlenger, & Galvin, 2006). Compared to opioids, few lethal

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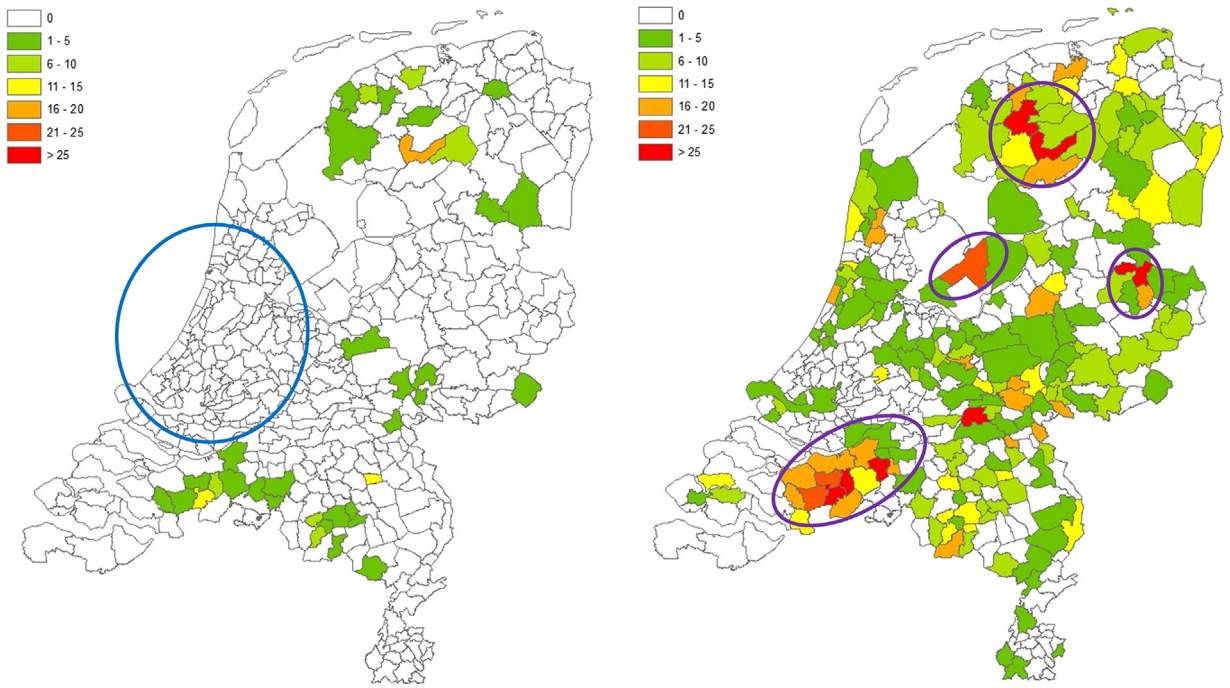

Fig. 1. Field work sites in The Netherlands. (For interpretation of the references to colour in the figure text, the reader is referred to the web version of this article.)

overdoses are associated with GHB, but non-lethal overdose, referred to among regular consumers as "*going knock*"(out), is reportedly very common (Chin, Kreutzer, & Dyer, 1992; Degenhardt & Dunn, 2008; Duff, 2005b; Korf, Nabben, Leenders, & Benschop, 2002).

GHB is a comparatively cheap liquid drug, used orally and easily synthesized without laboratory equipment by mixing sodium hydroxide and lukewarm water into Gamma Butyrolactone or GBL, its legal precursor (Brunt & Schrooten, 2014; Hearne, Alves, Van Hout, & Grund, 2017). Consumers attribute a range of positive effects to GHB, including increases in energy, euphoria, disinhibition, relaxation, self-confidence, sociability, sensuality and sexual arousal (Camacho, Matthews, Murray, & Dimsdale, 2009; Degenhardt, Darke, & Dillon, 2002; Korf et al., 2002; Sumnall, Woolfall, Edwards, Cole, & Beynon, 2008). Shortly after ingestion, people may however, experience drowsiness, dizziness, shallow breathing, slow heart rate, low blood pressure, nausea or vomiting (especially when combined with alcohol) (Chin et al., 1992; Korf et al., 2002; Korf, Nabben, Benschop, Ribbink, & van Amsterdam, 2014; Li, Stokes, & Woeckener, 1998; Schep, Knudsen, Slaughter, Vale, & Mégarbane, 2012; Thai, Dyer, Benowitz, & Haller, 2006). GHB consumers may quickly slide into heavy sedation and profound coma, with resultant loss of bowel/bladder control, headaches, amnesia, convulsions (when combined with stimulants in particular), (Chin et al., 1992; Li et al., 1998; Thai et al., 2006) and, finally, bradycardia and cardiac arrest (Schep et al., 2012). Symptoms are compounded when GHB is used in combination with depressants such as alcohol or benzodiazepines (Corkery et al., 2015; Zvosec, Smith, Porrata, Strobl, & Dyer, 2011). An antidote, such as naloxone for opioid overdose, is unlikely to be available anytime soon (Degenhardt, Darke, & Dillon, 2003).

Recurrent GHB overdose may cause serious neurotoxic harms at the level of memory and cognitive functioning similar to binge drinking or high dose ketamine use (van Amsterdam, Brunt, McMaster, & Niesink, 2012). Regular intake of GHB can quickly lead to dependence and severe withdrawal symptoms (Galloway et al., 1997), causing anxiety, paranoia, hallucinations, fever, tremor, fast heart rate and abnormal eye movements for weeks (Perez, Chu, & Bania, 2006; van Noorden, van Dongen, & Zitman, 2009), with sometimes life-threatening complications (Veerman, Dijkstra, & Liefting-Kluft, 2010). Globally, there were around 400 deaths associated with GHB described in the clinical literature in 2010 (Knudsen, Greter, & Verdicchio, 2008; Zvosec & Smith et al., 2010; Zvosec et al., 2011). As with opioids, GHB associated death usually coincides with ingestion of other drugs, such as alcohol, depressants and/or stimulants (Aromatario, Bottoni, Santoni, & Ciallella, 2012; Corkery et al., 2015; Thai et al., 2006; Wisselink & Mol, 2013; Wisselink, Kuijpers, & Mol, 2014). The actual role of GHB in GHB-related deaths is hard to establish. The drug is rapidly metabolized (half-life: 22–53 min), may be formed spontaneously post-mortem and is detectable in bodily fluids for a short period of five to twelve hours only (Kintz, Villain, Cirimele, & Ludes, 2004; Verstraete, 2004), complicating timely collection of post-mortem specimens, potentially resulting in underreporting (van Laar et al., 2014).

GHB in the Netherlands and Flanders

Use & dependence

In 2009, an estimated 144,000 Dutch people, aged 15–64 years, had ever used GHB, or 1.3%. 22,000 people used GHB in the last month (van Laar et al., 2014); Belgian population estimates are not available. In a 2013 web survey, 21.8% of regular nightlife participants aged 15–35 years in the Netherlands had ever used GHB and 5.1 did so in the last year (Goossens, Frijns, van Hasselt, & van Laar, 2014). Among Flemish visitors of clubs, dance events and "(mainstream) (rock) festivals," lifetime and last year GHB consumption were 6.8% and 3,2% in 2011 (Brunt & Schrooten, 2014) and 100 & 3.3% in 2012 (Wetenschappelijk Instituut Volksgezondheid, 2013). But that same year, visitors of peer information and support stalls (e.g. at festivals) reported 22.3%–22.8% lifetime and 8.3%–10.6% last year GHB consumption (Brunt & Schrooten, 2014). GHB use is particularly high in the Netherlands compared to other European countries or Australia, but more recently rising prevalence of GHB use is observed in both regions (Brennan & Van Hout, 2014; Degenhardt & Dunn, 2008; Horyniak et al., 2014).

In the Netherlands, *heavy* (Rehm et al., 2013) or *high risk* (Thanki & Vicente, 2013) GHB consumption is largely concentrated in 'hotbeds' of problematic GHB-consumption in Noord-Brabant, Flevoland, Twenterand and Friesland (marked in purple in Fig. 1.) (Wisselink & Mol, 2013). Between 2007 and 2012, addiction services in the Netherlands