

'Club drugs' and erectile function: Far from sexual 'ecstasy'

JC Lee MD FRCSC

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Club drugs such as 3,4-methylenedioxymethamphetamine ('ecstasy'), methamphetamine ('crystal meth') and ketamine ('Special K') are becoming more and more popular. Many young adults take these designer drugs to enhance sensory experiences at 'circuit parties' and 'raves'. Many users claim that these drugs also enhance sexual experience. However, many of these drugs have adverse effects on sexual function, as well as on sexual decision-making. This review examines four common club drugs, their systemic effects and their effects on sexual function, and hypothesizes on the causes of sexual dysfunction due to these drugs.

Key Words: *Club drugs; Risk behaviour; Sexual dysfunction*

Effects of 'traditional' recreational drugs, such as cocaine, alcohol and marijuana, on erectile and sexual dysfunction have been well documented (1-3). However, over the past decade, new, synthetic designer drugs have been emerging. The use of these agents is on the rise (4), especially among young individuals who attend 'raves' and 'circuit parties'. The four most common 'club drugs' include 3,4-methylenedioxymethampheta-

Consommation de drogues dans les bars et érection : loin de l'extase sexuelle

RÉSUMÉ : Les drogues souvent trouvées dans les bars comme la MDMA (N-méthyl-3,4 - méthylènedioxyamphétamine), aussi appelée « extase », la méthamphétamine (cristaux de méthamphétamine) et la kétamine (« spécial K ») gagnent de plus en plus de terrain. Beaucoup de jeunes adultes consomment ces drogues de confection pour accroître leurs expériences sensorielles dans des « partys clandestins » ou des « partys de circuit nocturne ». Bon nombre d'utilisateurs affirment que ces drogues améliorent également l'expérience sexuelle. Pourtant, plusieurs d'entre elles altèrent non seulement le fonctionnement sexuel mais aussi le jugement concernant les activités sexuelles. Le présent article traite de quatre drogues souvent trouvées dans les bars ainsi que de leurs effets généraux et de leurs effets particuliers sur le fonctionnement sexuel et présente des hypothèses quant aux causes de dysfonctionnement sexuel attribuable à ces drogues.

mine (MDMA: 'ecstasy'), gamma-hydroxybutyrate (GHB), ketamine ('Special K') and methamphetamine ('crystal meth', 'crank', 'ice'). Little is known about their effects on sexual function. The purpose of the present review is to analyze the available literature on club drugs to examine their systemic effects and to hypothesize on their effects on erectile function, as well as sexual risk-taking behaviour.

Division of Urology, University of Calgary, Calgary, Alberta

Correspondence: Dr JC Lee, Prostate Cancer Institute, 100-1011 Glenmore Trail SW, Calgary, Alberta T2V 4R6.

Telephone 403-232-6363, fax 403-269-4630, e-mail jayclee77@hotmail.com

COPYRIGHT PULSUS GROUP INC. - DO NOT COPY**MDMA**

MDMA is the most common club drug being used and is probably the most recognized. This oral drug is an amphetamine derivative that is chemically related to both amphetamines and hallucinogens (5). An incidence study in the United States has found a 69% increase in use by college students from 1997 to 1999 (6). Users state that they use this substance to increase sensory stimulation at raves and dance parties. Effects include increased positive mood and feelings of intimacy with others, and increased energy and stamina (7). Many of these raves and circuit parties start in the early hours of the morning and extend into the late afternoon. Patrons state that they 'require' the drug to enhance the experience and to be able to endure the long hours of the parties. However, they document that they develop a tolerance to the positive effects of the drug, and hence, they do not use it regularly.

There has been a great deal of concern regarding this drug because of the possible severe adverse systemic effects, as well as the number of documented deaths due to its use. In the United Kingdom, the death rate of 15 to 24-year-old users was found to be from 0.2 to 5.3 per 10,000. Severe systemic effects include hyperthermia, seizures, cardiac abnormalities (tachycardias), hyponatremia, rhabdomyolysis, acute renal failure and death (8). The majority of effects are due to the drug's sympathomimetic properties. Due to the heat of the dance venues, as well as sympathetic effects, users experience polydipsia, and can develop severe hyponatremia and seizures.

The sympathomimetic effects of the synthetic amphetamine cause systemic vasoconstriction. It is hypothesized that this is one factor in the drug's role in erectile dysfunction in young, otherwise healthy, users. The negative effects of these club drugs on sexual dysfunction have been indirectly determined by the frequent concomitant use of 'Vitamin V' (Viagra; Pfizer Inc, Canada) (9). Users report episodes of erectile dysfunction and state that sildenafil is taken as an adjunct to prevent sexual failure.

Recent studies with animal models and human cell models have demonstrated that MDMA is neurotoxic to serotonergic neurons (8,10). Serotonin is known to be a central neurotransmitter in sexual function; it is thought to be inhibitory (11). Serotonin-selective reuptake inhibitors, used in the treatment of depression, are thought to cause erectile dysfunction and problems with libido by increasing the central circulating levels of serotonin. It is unknown which serotonergic neurons are affected by MDMA and whether this neurotoxic effect of MDMA negatively affects the sexual function of the user. The decreased serotonin levels may explain the sensation of increased sexual interest experienced by subjects who use MDMA, but do not explain the associated sexual dysfunction.

GHB

GHB is another club drug that is gaining popularity. This drug was sold in health food stores due to its purported anabolic, muscle-building effects. The Food and Drug

Administration in the United States pulled this drug from retail markets in 1991 (12). This compound is structurally similar to the central inhibitory neurotransmitter gamma-aminobutyric acid.

GHB is reported to increase feelings of euphoria, relaxation and sexuality in users. Participants describe the intoxication from GHB to be similar to alcohol intoxication or the hypnotic intoxication associated with sedatives. However, many adverse effects of GHB have been documented. In regular users, loss of consciousness was reported by 66%, overdose by 28% and amnesia by 13% (13). Systemic side effects include nausea, vomiting, dizziness, confusion, drowsiness, respiratory depression, bradycardia and hypotension (14).

GHB is known to have effects on the central neurotransmitter, dopamine. GHB is normally found in the human brain, especially in the basal ganglia (15). It primarily acts to inhibit dopamine release *in vivo*, but, in some instances, may have the paradoxical effect of stimulating dopamine release (16). Dopamine has been documented to be a central initiator of erectile function (12). If GHB inhibited dopamine release, it would be associated with erectile dysfunction; however, if GHB stimulated dopamine release, then this effect may explain the subjective feelings of increased sexuality in GHB users.

The more alarming aspect of GHB is its effect on sexual behaviour. GHB in its liquid form can be mixed with alcohol, masking its taste. Due to its amnesic qualities, as well as causing an increase in sexual feeling, it has been implicated as a 'date rape' drug (17).

METHAMPHETAMINE

Methamphetamine is a club drug known by many names, including 'crystal meth', 'crank', 'ice' and 'speed'. This drug is another amphetamine derivative and can be manufactured from ephedrine. As with all designer amphetamines, this drug is purported to produce feelings of euphoria, energy and a 'high' (18).

Methamphetamine is probably the most dangerous of the modern club drugs. Compared with nicotine and alcohol, it has significantly more serious psychic, physical and withdrawal symptoms. The dependence developed with methamphetamine is worse than that with alcohol or nicotine (19). As well, methamphetamine has significant cardiovascular effects due to its sympathomimetic properties (20). This drug can cause tachycardia, arrhythmia, hypertension (systemic, pulmonary), myocardial infarction and death.

Its effects on sexual function are multiple. Again, due to the sympathomimetic properties of amphetamines, which cause vasoconstriction, vascular erectile dysfunction can ensue. As well, methamphetamine has been demonstrated to induce central dopamine depletion and neurotoxicity (21). As previously mentioned, dopamine has been found to be a central initiator of sexual function. Interestingly, one study (22) examined the use of apomorphine as a neuroprotectant in methamphetamine-induced neurotoxicity. Apomorphine, a dopamine agonist used in the treatment of

erectile dysfunction, was found to protect nerves from the detrimental effects of methamphetamine. Thus, it appears that dopamine depletion may be another pathway that causes erectile dysfunction in methamphetamine users.

KETAMINE

Ketamine is a derivative of phencyclidine, a known psychotropic recreational drug. Anaesthetists commonly use this drug for induction of anaesthesia. Ketamine is reported to produce analgesia and amnesia. Ketamine is documented to cause vivid, technicolour visual, auditory, and proprioceptive hallucinations (23). This effect is the allure of ketamine as a recreational drug.

As with the other club drugs, ketamine has many systemic effects. This drug has been shown to directly stimulate the central nervous system, leading to increased sympathetic nervous system outflow (24). Thus, ketamine's hemodynamic effects include tachycardia, hypertension, arrhythmia and an increase in the cardiac index.

The vasoconstriction caused by ketamine could potentially lead to vascular erectile dysfunction.

SEXUAL BEHAVIOUR AND CLUB DRUGS

Besides the concern of the physiological effects of many of these drugs on peripheral vasculature and erections, these drugs can affect sexual decision-making and risk-taking behaviour. The behaviour and the sexual choices of gay and bisexual men using club drugs at circuit parties has been examined (9,25). In one study (25), 295 gay or bisexual men were screened. Of these men, 80% had used MDMA, 66% ketamine, 43% methamphetamine, 29% GHB, 14% sildenafil and 12% poppers (amyl nitrate); 53% had used four or more drugs. Unprotected anal intercourse with partners of unknown HIV serostatus or opposite HIV serostatus was reported in 21% of men who were HIV-positive and 9% of men who were HIV-negative. This alarming rate of high risk behaviour was found to be higher than those reported without the use of club drugs.

Another concern relates to the illicit use of sildenafil due to the side effects of the recreational drugs. The use of nitrates is a known contraindication to the concomitant use of sildenafil. One study (9) demonstrated that some men were using sildenafil with amyl nitrate, putting themselves at cardiovascular risk.

Many of the club drugs have significant sympathomimetic effects that cause significant vasoconstriction, which can lead to erectile dysfunction. Also, many of these drugs have central and neurotoxic effects (GHB, methamphetamine), which may have effects on neurotransmitters involved in the central initiation of the erectile pathway. More worrisome is the increase in high risk sexual behaviour and sexual assault. Young adults need to be informed of the risks that these drugs pose to their sexual health. As well, when assessing young adults who present with sexual dysfunction, the use of club drugs should be included in the sexual history. Counselling patients regarding the effects of

these drugs should be a part of the treatment of erectile dysfunction in club drug users.

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