

Illicit drugs and the consequences for the management of the person with diabetes

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Methamphetamine

- Amphetamine derivative
- Also known as
 - Speed – usually denotes powder
 - Meth
 - Crystal
 - Shabu
 - Glass
 - Shard
 - Ice

Methamphetamine

- Can be taken orally, snorted, smoked or injected
- Onset immediate with IV, 30-40 oral
- Duration ~4-8 hrs, Half life 4-6 hrs
- Drug testing
 - Urine up to 1-3 days
 - Blood up to 1-3 days
 - Hair up to 90 days
- Dose
 - Depends on frequency of use and tolerance.
 - In pure form ~50 milligrams can be fatal for a non-user

Effects

- Euphoria
- Hyperexcitability, Extreme nervousness
- Tachycardia, Vasoconstriction
- Sweating, dizziness
- Restlessness, insomnia
- Tooth grinding, incessant talking
- Bronchodilation
- Pupil dilation (mydriasis)
- Some evidence can improve mental capacity

Effects

- Severe hyponatraemia and cerebral oedema have been reported
- Mechanism thought to be due to psychogenic polydipsia and IADH
- Some studies have shown permanent destruction of serotonergic and dopaminergic neurons

Treatment

- No specific antidotes
- Treatment is largely symptomatic
- Treat and support body systems
 - ABCDE
 - Oxygenation and ventilation
 - Cooling for malignant hyperthermia
 - Sedation for hyperactivity
 - Chlorpromazine to block serotonin syndrome
 - Fluid resuscitation
 - Correction of electrolytes and acid base disturbance
 - Surgery for haemorrhage

Ecstasy

Chemical name

- 3,4 methylenedioxymethamphetamine (MDMA)
- related to amphetamines

Other names

- E, XTC, Eccy, Pingers, pills, bikkies, flippers, molly, disco biscuits

MDMA/Ecstasy

- MDMA is generally classed as a stimulant with mild hallucinogenic properties
- MDMA enhances extracellular concentrations of:
 - serotonin
 - dopamine
- All amphetamine-type substances share common effects and problems related to their use.

How Ecstasy is Used

Forms

- tablets, capsules, powder, liquid

Routes of administration

- oral (crushed / snorted), smoked, anal ('shelved') or inserted in vagina ('shafted'), some IV use

Dose

- normally 75–150 mg in one good quality tablet
- usual dose is 1–2 tablets, although more may be taken if desired effect not reached.

The 'Ecstasy Experience'

Coming up

- Tightening of muscles, esp. jaw
- dilated pupils, visual distortions
- Smooth or sudden nausea or vomiting
- Strong pulse, incr. temp
- Confusion, panic.

Plateau

- Feel good, happy, relaxed, open, loving
- Heightened senses
- Energy, confident, talkative
- Decreased urine output
- Increased thirst

Coming down

- Physical exhaustion, flat, depressed, tired, anxious irritable, paranoid
- Comedown more intense if IDU / polydrug user

0 4 8
Hours After Ingestion

Pathophysiology

Common effects

- empathy, euphoria
- lack of inhibition, increased sensuality, erectional dysfunction
- deep insight, panic attacks

Rare effects: auditory & visual hallucinations

Pathophysiology

Cardiovascular

- Autonomic hyperactivity with catecholamine surges
- Tachycardia and hypertension
- Heart failure and fatal arrhythmias more likely with pre-existing disease (pulmonary and cardiac, eg WPW)
- Hyperthermia

Pathophysiology

Neurologic

- Dilated pupils causing blurred vision
- Short-term hypertensive surges
- Subarachnoid and intracranial haemorrhage
- Cerebral infarction
- Vessel disruption more likely with pre-existing disease
- Bruxism (teeth grinding) & trismus (jaw grinding) is common

Pathophysiology

Serotonin syndrome

- Altered conscious state
- Muscle cramping or rigidity
- Increased BMR
- Hyperthermia (can be up to 42.8°C) & dehydration
- Vigorous dancing at high temperatures can lead to muscle breakdown - rhabdomyolysis

Pathophysiology

Hyponatraemia

- Increased serum osmolality causes antidiuretic hormone (ADH) release
- ADH secretion fails to turn off
- Syndrome of inappropriate ADH release (SIADH) results
- Increased water intake can lead to water intoxication
- However, some have blunted thirst sensation
- Seizure and death

Emergency Management

- Supportive management as no specific antidote
- Acute panic
 - reassuring environment
 - oral benzodiazepine
- Severe agitation
 - electrolyte management
- Seizure
 - DRABCD
 - IV diazepam or clonazepam

Emergency Management

- Aggressive cooling for malignant hyperthermia
- Sedation for hyperactivity
- Chlorpromazine to block serotonin syndrome
- Avoid beta blockers with tachycardia as potential for unopposed alpha effects
- Dantrolene for hyperthermia

New Psychoactive Substances

Synthetic Cannabis Synthetic Marijuana

Synthetic Cannabis (Herbal Cannabis)

- The chemical structure of synthetic cannabinoids is different to THC (the active component of cannabis) however they both act on the cannabinoid system in the brain producing similar effects.
- Synthetic cannabinoids are usually sold combined with herbs and aim to mimic the effects of cannabis.
- Usually consist of dried herbs that are sprayed with synthetic material similar to THC.

Synthetic Cannabis

Found in products with brand names such as:

- | | |
|---|--|
| • Kronic | • Exclusive (Original, Mint, Cherry) |
| • Northern Lights | • Chill Zone (Berry, Mint, Original) |
| • Kaos | • Chill Out (Cherry, Mint, Original) |
| • Spice | • Sensation (Vanilla, Orange, Bkberry) |
| • Mango | • Chaos (Mint, Original, Cherry) |
| • Voodoo | • Zen |
| • Intense Incense | • Zen Ultra |
| • K2 | |
| • Tai Fun (Blackberry, Vanilla, Orange) | |

Usage

- Mode of use:
 - Smoked
 - Drink as an infusion/herbal tea
 - Vapourised in e-cigarettes

Pharmacological Effects of Synthetic Cannabinoids

- Mental (these affects predominate):
 - Altered state of consciousness
 - Mild euphoria and relaxation
 - Perceptual alterations (time distortion)
 - Intensification of sensory experiences
 - Pronounced cognitive effects
 - Impaired short-term memory
 - Anxiety
 - Paranoia
 - Avoidant eye contact
 - Agitation
 - Delusions (paranoid, grandiose)
 - Psychosis

Pharmacological Effects of Synthetic Cannabinoids

- Physical:
 - Increase heart rate & blood pressure
 - Dry eyes
 - Diaphoresis
 - Mild decrease in potassium
 - Seizures
 - Reduction in motor skill acuity
 - Increase in reaction times

Dependence Syndrome

Withdrawal:

- "Inner unrest"
- Drug craving
- Nightmares
- Profuse sweating
- Nausea
- Tremor
- Headache
- Hypertension
- Increased HR

Management

- No pharmacologically specific antidote
- Supportive care
- Benzodiazepines for agitation and anxiety
- Intubation in one case for decreased respiratory rate
- Duration of effects???

4-MMC

- Mephedrone, 4-methylmethcathinone
- Present in products marketed as plant food and bath salts – not for human consumption
- 4-Methylmethcathinone is a synthetic stimulant with euphoric and empathogenic effects that gained popularity in the U.K
- **Terminology / Slang**
 - Mephedrone, 4-MMC, Meow, M-Cat, Plant Food, drone, kitty cat, bubbles

4-MMC

- Usually taken as capsules or powder
- Effects last 2-3 hours when taken orally
- Negative effects are similar to ecstasy/MDMA and include:
 - Desire to redose, uncomfortable changes in body temperature (sweating and chills)
 - Palpitations, impaired short term memory, insomnia
 - Tightened jaw muscles, grinding teeth, and light headedness

Mephedrone Adverse Effects

- | | |
|--|---|
| <ul style="list-style-type: none">• Intense alertness, euphoria• Empathy, talkativeness• Intense sensory input• Sexual arousal• Perceptual distortions• Hallucinations• Severe paranoia• Aggression• Panic attacks | <ul style="list-style-type: none">• Headache, tremors, blurred vision, seizures• Anxiety, agitation, aggression, depression, psychosis• Tachycardia, elevated BP, chest pain• Body temperature lability• Nausea, vomiting, diarrhoea• Renal dysfunction, urinary retention |
|--|---|

Bath Salts:

- Ivory Wave
- Ivory Pure
- Ivory Coast
- Purple Wave
- Vanilla Sky

Bath Salts

- Sold in 500mg packets labelled “for novelty use only”, “a soothing bath salt”.
- Contains a mix of several substances including the chemical methylenedioxypyrovalerance (MDPV)

Bath Salts

- Similar properties and effects to MDMA (ecstasy)
- Usually snorted, smoked or injected

Administration – white/brown powder; capsules and tablets also available

- Oral (mouth, “bombing”)
- Intranasal (snorting, “keying”)
- Intramuscular
- Intravenous
- Rectal
- Gingival
- Inhalation via smoking

Pharmacological Effects of “Bath Salts”:

- Physical:
 - Increase heart rate & blood pressure
 - Pupil dilation
 - Dizziness
 - Nausea
 - Breathing difficulties
 - Headache
 - Chest pain
 - Bruxism
 - Tremors
 - Insomnia
 - Myocardial infarction

Pharmacological Effects of “Bath Salts”:

- Mental:
 - Hyperactivity, arousal & over stimulation
 - Increased energy & motivation
 - Euphoria - agitation
 - Diminished perception of the requirement for food and sleep
 - Talkativeness
 - Increases sexual arousal
 - Crave to redose frequently

Health Hazard?

- Bizarre behaviour
- Phenomenal physical strength
- Self mutilation
- Suicide
- Persistent paranoid psychosis
- Persistent symptoms of paraesthesias and mood changes for days to weeks after using

Dependence

- Like amphetamines – induce tolerance and dependency in at least 30 percent of users with craving and impaired control

Long Term Effects

- Little is known
- Potential neurotoxicity with decrease dopamine transporter activity in the basal ganglia leading to a Parkinson's like disorder

Management

- No specific antidote exists
- Supportive care
- Aggressive sedation with benzodiazepines for increased heart rate, seizures, agitation and hypertension
- Hyperthermia may require cooling
- If severe (persistent vital sign elevation, neuro and psychiatric abnormalities), all patients should be admitted and have:
 - ECG
 - Serial temperature checks
 - CK
 - Electrolytes
 - Renal/liver functions

NBOMe

- Cathinone
- Also known as synthetic LSD
- Severe psychedelic effects
- Usually sold as “blotters”
- Usually taken sublingually or intranasally
- Street names – N-bomb, Smiles, 25I, 25C, 25B, Spice, Melting, Smiley Paper, Pandora, divination, solaris

Clinical Effects

- Hallucinations, agitation, seizures
- Hyperthermia, tachycardia, hypertension, tachypnoea
- Extreme/rapid cycling emotions
- Mydriasis, flushing, diaphoresis
- Nausea, vomiting,
- Facial dystonia (teeth grinding, grimacing)
- Rhabdomyolysis

(cont)

- Insufflation - immediate pain nasal mucosa

Flakka

- Flakka is a street drug with origins in South Florida.
- One of the newer chemicals in the booming category of synthetic or designer drugs, Flakka is typically made from a synthetic version of an amphetamine-like stimulant in the cathinone class called alpha-PVP
- (alpha-pyrrolidinopentiophenone).

Flakka

- Alpha-PVP is chemically similar to other synthetic cathinone drugs and takes the form of a white or pink, foul-smelling crystal that can be eaten, snorted, injected, or vapourised in an e-cigarette or similar device. Vapourising, which sends the drug very quickly into the bloodstream, may make it particularly easy to overdose. Like other drugs of this type, alpha-PVP can cause a condition called "excited delirium" that involves hyperstimulation, paranoia, and hallucinations that can lead to violent aggression and self-injury.

Short-Term Effects of Flakka

- Similar to other stimulants, Flakka use results in a flood of dopamine in the brain. Dopamine is a neurotransmitter that helps regulate the brain's reward and pleasure centers. Additionally, Flakka hinders the reuptake of this neurotransmitter by the brain cells, producing an intense feeling of euphoria.

Short-Term Effects of Flakka

- Similar amphetamines, short-term effects include:
 - Euphoric sensations.
 - Rapid heart rate and palpitations.
 - Increase in blood pressure.
 - Alertness.
 - Aggressive behaviour.

Long-Term Effects

- Long-term effects are not yet known. Flakka is one of the more recent synthetic drugs and research into its effects isn't extensive. However, research that has been conducted has shown that the drug can be toxic to the kidneys and cause renal failure.

"Nangs, Bulbs & Whippets"

Nitrous Oxide

- Nitrous oxide use is usually experimental and, as a result, long-term use is rare. Heavy use can lead to a depletion of vitamin B12, which can result in numbness, and if B12 deficiency is left untreated long-term nerve damage can result.
- When inhaled by inexperienced users, nitrous oxide often leads to unconsciousness resulting from hypoxia due to the displacement of oxygen from the lungs of the user. Releasing a whipping gas cartridge into a balloon and then inhaling it leads to the inhalation of 100% nitrous oxide – fatalities have occurred as a result.

Illicit drugs and glycaemic control

Regular illicit drug users with diabetes often have poor diabetic control and more frequent hyperglycaemic crises.

Cocaine

- Cocaine is a stimulant most commonly inhaled intranasally though also smoked as crack cocaine crystals.
- It acts by encouraging the adrenal medulla to release the catecholamines adrenaline and noradrenaline.
- Studies have also shown increased concentrations of corticotropin and cortisol after cocaine administration. These, of course, are all counter-regulatory hormones that act to increase blood glucose levels, altering carbohydrate metabolism. They inhibit pancreatic insulin secretion and activate glycogenolysis and gluconeogenesis.
- This leads to increased glucose production and decreased glucose clearance.

Heroin

- Opiates such as heroin appear to interact with the endocrine pancreas. In vivo studies in animals suggest that central administration of opiates acts via sympathetic activation causing impaired endogenous insulin secretion, therefore hyperglycaemia.
- Studies in human subjects suggest peripheral administration tends to stimulate both insulin and glucagon stimulation.
- In heroin addicts there appears to be a defective pancreatic β -cell response to glucose stimulation. Some studies have suggested that, even where glucose levels are normal in opiate addicts, there is an altered glucose metabolism and hyperinsulinaemia very similar to that seen in people with type 2 diabetes

Stimulants (amphetamines, ecstasy)

- Act by increasing neurotransmitter concentrations of sympathomimetics both centrally and peripherally.
- Their effects are mediated by the varying increases of adrenaline, noradrenaline, dopamine, serotonin and cortisol.

Stimulants (amphetamines, ecstasy)

- Peripherally, the increase in catecholamines acts to stimulate glucose production and inhibit glucose clearance. When combined with an absence of insulin this could potentially rapidly produce hyperglycaemia.

Other drugs

Cannabis use has been associated with hypoglycaemia though these substances do not appear to have any direct effect on glucose or fatty acid metabolism.

The hypoglycaemia is usually related to impaired judgement, forgetting to eat or not taking insulin properly. Users are at risk of not recognising a hypo or not being bothered to treat it.

While cannabis is not known to have a direct effect on glucose metabolism, it does increase self-reported hunger. Increased appetite combined with memory impairment and insulin omission could potentially result in significant hyperglycaemia.

Alcohol

- The metabolism of alcohol by acetaldehyde and its preference as a source of energy over other nutrients has important implications for glucose handling.
- Due to the reduction of NAD to NADH during alcohol metabolism, NAD is less available as a cofactor for glucose synthesis resulting in inhibition of gluconeogenesis.

Alcohol

- The depletion of glycogen stores can result in hypoglycaemia especially when alcohol is not consumed with carbohydrate or when combined with malnutrition.
- However, as alcohol does not affect glycogenolysis, previous glycogen stores can generally still be used in the immediate term.

Alcohol

- Once alcohol is metabolised, there are attempts to re-establish glycogen stores and in the presence of exogenous insulin, delayed hypoglycaemia may occur in people with type 1 diabetes.
- This phenomenon, and a reduction in counter-regulatory growth hormone, account for the “morning after evening” effect where hypoglycaemia can be delayed 8-12 hours after alcohol intake.

Be Safe !

Advice should be given to maintain safety prior, during and after taking drugs or alcohol.

- Where possible check blood glucose levels before taking; if low, have some food
- Drink plenty of water

Be Safe !

- Check glucose levels after “coming down”
- Eat a meal containing carbohydrates as soon as possible after coming down
- Carry identification stating that the user has diabetes and requires medication

Advice

- Know what you are taking.
- Do not take something if you're unsure what it is.
- Never take drugs alone. If you take drugs, always have someone sober with you who you trust, who knows what drug you are taking and who knows you have diabetes.

Advice

- Be in a safe, comfortable environment. If you take drugs, make sure your friends are with you.
- Always wear your medical alert identification
- Never stop taking your insulin. This could lead to higher blood glucose levels and serious health risks.

All illicit drugs pose an even greater risk to people with diabetes because of their effects, both direct and indirect, on blood glucose levels and self-care behaviours.

While it is not the role of the healthcare provider to prevent drug use, they have a duty to inform their patients of the short and long-term effects of illicit drugs, and to promote safe behaviours in people who choose to take them.

Chocolate

- Users may experience cravings
- May affect mood
- Contains cannabinoid-like fatty acids and may mimic effects of marijuana