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The potential dangers of mephedrone in people with diabetes: a case report

Mephedrone is a cathinone derivative that has recently been re-classified in the UK from a 'legal high' to class B (intermediate category) drug. There are few scientific publications describing the clinical effects of its use[1–3] and no reports of its impact in people with diabetes.

We present the case of an 18-year-old man with type 1 diabetes (T1DM) who was admitted with ketoacidosis following self-reported mephedrone use. He was diagnosed with T1DM at the age of 4 years and had recently made the transition from the paediatric services to the young adult diabetes clinic. He had long-standing difficulties with self-management of his diabetes and frequently did not take his insulin as prescribed. Despite receiving an optimal insulin analogue-based regimen, his glycaemic control was poor as indicated by a glycated haemoglobin A_{1c} of 11.2% (99 mmol/mol). He had recently dropped out of college which worsened his already-strained relationship with his mother. He smoked 15 cigarettes per day but took little alcohol.

He admitted to snorting mephedrone regularly including during the two days prior to admission. He reported no other drug use and he was unable to remember whether he took his insulin reliably or ate normally during this period. He presented with lethargy and a one-day history of vomiting and was ketoacidotic on admission (venous glucose 33 mmol/l, serum bicarbonate 7.5 mmol/l, serum pH 7.12, urinary ketones 4+). He was treated with intravenous insulin and fluids and made an uncomplicated recovery. Toxicology sampling was not undertaken, not least because there was no urine test for mephedrone at the time the patient presented.

Two weeks prior to his current admission, he had been admitted into hospital with a severe hypoglycaemic episode. It is unclear whether this was related to drug use.

We cannot be certain that the ketoacidosis was caused by the mephedrone but no other specific precipitants, including sepsis, were found. The presentation may have been merely an extension of his previous poor diabetes management; however, it is also possible that mephedrone was a contributory factor, not least because the patient believed this to be the case.

Cathinone compounds may directly increase the risk of diabetic ketoacidosis by stimulating the central nervous system. Mephedrone binds to monoamine transporters and increases the availability and release of dopamine, serotonin, and noradrenaline.[4,5] In people with T1DM, the resultant sympathomimetic toxicity will antagonize the action of insulin and may promote hyperglycaemia and increased lipolysis, which may precipitate ketoacidosis. This is more likely to occur in someone, like our patient, who has previous poor control and insulin under-utilization.

Mephedrone may also indirectly impair an individual's ability to self-regulate and manage their diabetes. The mephedrone 'high' may make users less inclined to perform blood-glucose monitoring. The normal warning symptoms of hyperglycaemia (and hypoglycaemia) may be altered while excessive usage of mephedrone may impair memory, concentration, and cause hallucinations. The compulsive need for continued use to the point of ignoring the need for sleep, regular meals, as well as monitoring and treatment of diabetes will all serve to incapacitate the person's ability to manage their diabetes. This appeared to be the case for our patient who was unable to give a coherent account of his diabetes management during the two days prior to his admission following the mephedrone use.

The problem of diabetic ketoacidosis is not limited to mephedrone as other street-drug use has been associated with poor diabetes control and diabetic ketoacidosis. In a large study from Spain, 21% of a series of 253 episodes of diabetic ketoacidosis were associated with substance abuse. Cocaine, followed by cannabis and alcohol, was the most frequently involved drug but multiple substance abuse occurred in two-thirds of cases.[6] This may reflect an underestimate because screening for drug use was only performed in 40% of events. Similar findings were observed in an Australian study where more than 50% of young adults who presented with diabetic keotacidosis admitted to using cannabis (80%), ecstasy (60%), ketamine (60%), benzodiazepines (30%), and heroin (30%).[7] Multiple drug use was again common (70%). Overall 5–25% in adolescents aged 12–20 years and 29% in young adults aged 16–30 years have taken recreational drugs with cannabis and stimulants being the most popular drugs.[8]

Healthcare professionals should be aware of the possibility that street-drug use including legal high drugs may be associated with poor diabetic control and increased risk of ketoacidosis. A high index of suspicion is needed and the patient should be asked about street drugs because, in light of the steady stream of novel stimulants, it is likely that no immediate laboratory test will be available, and many young adults are reticent about volunteering this information.

Young people with T1DM should be educated about the potential adverse health effects of these drugs in order that risk-reduction measures can be taken if needed. Pragmatically, information should be provided about the importance of regular eating, insulin treatment, frequent monitoring before and after

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drug use as well as the precautions of informing friends of their diabetes and wearing medic-alert bracelets.

Yours,

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