Findings that shed new light on the possible pathogenesis of a disease or an adverse effect

The serotonin syndrome as a result of mephedrone toxicity

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Summary

A 22-year-old male presented to an emergency department by ambulance. His clinical picture included tachycardia, diaphoresis, hypertonia, hyper-reflexia and clonus. The patient became hyperthermic and deteriorated over the next hour. The principal substance ingested was mephedrone and appropriate treatment for the serotonin syndrome resulted in a sustained recovery over 15 h.

BACKGROUND

Mephedrone has become the fourth most prevalent recreational drug after cannabis, ecstasy and cocaine over the past 2 years. There have been a number of reports internationally about the dangers of this substance.^{1–3} This case highlights the fact that mephedrone toxicity may present with the serotonin syndrome.

CASE PRESENTATION

A 22-year-old male presented to an emergency department by ambulance at 02:00 h. This patient was tachycardic and sweating profusely. He was alert and cooperative but had difficulty ambulating. He had no known drug allergies. His current medications were fluoxetine (40 mg mane) and olanzapine (10 mg nocte). He had also been prescribed zopiclone during the night as he was agitated. The past medical history included depression, mania and self-harm over a 2-year period.

Two bags belonging to the patient were noted—a plastic bag labelled ‘Plant Food’ and a brown paper bag labelled ‘Red Doves’. The patient admitted to having taken approximately 40 capsules from these bags over a 4-h period.

On examination the patient man was tachycardic and sweating profusely. His pupils were dilated and he had a resting tremor. Neurologically he was bilaterally hypertonic and hyper-reflexic in the arms and, more severely, in the legs. Clonus was easily induced. The patient was unable to stand unaided. The cranial nerves were intact and he did not have nystagmus.

INVESTIGATIONS

An ECG demonstrated sinus tachycardia. Arterial blood gas showed metabolic acidosis (pH 7.03, HCO₃[−] 16.2 mmol/l, base excess −9 mmol/l). The patient’s creatinine (112 µmol/l), bilirubin (30 µmol/l) and aspartate transaminase (50 IU/l) were mildly elevated.

DIFFERENTIAL DIAGNOSIS

- ▶ The serotonin syndrome
- ▶ Sympathomimetic toxidrome
- ▶ Neuroleptic malignant syndrome.

TREATMENT

General supportive care, intravenous fluids and oral diazepam were administered.

OUTCOME AND FOLLOW-UP

After repeated doses of diazepam the patient’s symptoms began to improve and his temperature decreased. He was admitted to a ward under medical care and his fluoxetine (40 mg mane) was withheld. He was discharged 15 h after admission when his neurological signs had ceased.

DISCUSSION

Many case reports where mephedrone had a role have been published over the last year.^{1–3} Most cases involve the abuse of multiple substances and some have resulted in death.^{2–3} A case of mephedrone toxicity confirmed by toxicological tests was recently reported.⁴ No case reports linking the serotonin syndrome to mephedrone toxicity have been published to date.

Mephedrone is a white powder most commonly taken in capsule form. It can also be snorted, made into tablets, eaten or injected intravenously. Street names for the drug include Plant Food, Miaow-Miaow, M-Cat, MMC, Bubbles (with ketamine), Diablo or Doves (with β-ketoamphetamines).

Methylone is a metabolite of mephedrone.⁴ Methylone has been shown to increase serotonin release and to inhibit serotonin and dopamine reuptake in rat brain synaptosomes.⁵ Little is known about the interaction between mephedrone and other substances or medications.

This patient met the Hunter criteria for the serotonin syndrome.⁶

Hyperthermia is a significant cause of mortality as high temperatures can lead to metabolic acidosis, rhabdomyolysis, renal failure, disseminated intravascular coagulation, coma and death. Benzodiazepines reduce hyperthermia in patients with the serotonin syndrome as they cause sedation and relax the muscles.⁷

Many therapeutic drugs can cause the serotonin syndrome including all common antidepressants (SSRIs, MAOIs, SNRIs, TCAs, etc) and some opioids (pethidine, fentanyl and tramadol among others).⁷

Learning points

- ▶ Mephedrone, a relatively new recreational drug, may cause the serotonin syndrome.
- ▶ Hyperthermia is a significant cause of mortality in patients with the serotonin syndrome.

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Competing interests None.

Patient consent Obtained.

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