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Hyponatraemia at a rave

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A 30-year-old woman took an 'ecstasy' tablet for the first time while attending a rave. She began to feel unwell about four hours after ingestion and one hour later collapsed and had a generalised seizure. On admission to hospital 30 minutes later she was confused and agitated. She gradually became less responsive, was incontinent several times and suffered two further seizures.

On examination, she was hypothermic (34°C), the pulse was 80 beats/min and regular; her blood pressure was 110/70 mmHg. There were no focal neurological signs but the plantar responses were both extensor. Biochemical investigations were as follows: sodium 117 mmol/l, potassium 3.1 mmol/l, CO₂ 25 mmol/l, urea 1.9 mmol/l, liver function tests and coagulation screen normal, pO₂ 27.7 kPa, pCO₂ 4.6 kPa, hydrogen ion 36 nmol/l, and bicarbonate 19.5 mmol/l.

Over the next 24 hours she developed a pyrexia (39°C), remained confused and had several further seizures. She became oliguric with dark coloured urine.

Questions

- 1 What is the most likely cause of her hyponatraemia?
- 2 What two investigations would be useful?
- 3 What is the cause of her oliguria?
- 4 What two tests would you perform?

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Answers

QUESTION 1

Water intoxication.

QUESTION 2

Urinary osmolality and sodium concentration.

QUESTION 3

Myoglobinuria secondary to rhabdomyolysis.

QUESTION 4

Determination of urinary myoglobin and plasma creatinine phosphokinase.

Further history from her husband indicated that she had been drinking large quantities of water at the rave in an attempt to prevent dehydration. When she began to feel unwell, she believed that she was dehydrated and continued drinking until she collapsed. Her urinary osmolality was 38 mmol/kg with a urinary sodium concentration of only 1.0 mmol/l which is a maximally dilute urine. When she later became oliguric, the urine contained large quantities of myoglobin and plasma creatinine phosphokinase rose to 16 760 IU/l.

Discussion

Amphetamines ('speed'), 'ecstasy' (3,4-methylenedioxymethamphetamine (MDMA)) and its derivatives 'eve' (MDEA) and 'ice' (MDA) are abused extensively at raves and nightclubs in the UK. Awareness of the possible risks of dehydration among users is increasing and information leaflets that are available at events advise dancers to keep cool and drink plenty of fluid.

Three previous cases of hyponatraemia following the taking of MDMA have been reported.^{1,2} Only one was described as having drunk large quantities of fluid but the urine was concentrated and a syndrome of inap-

propriate antidiuretic hormone secretion was hypothesised.

Acute hyponatraemia secondary to water intoxication was first reported in 1923 by Rowntree.³ The plasma becomes dilute and there is an influx of water into tissues, including the brain. It occurs primarily in patients with chronic psychiatric disorders,^{4,5} but has been described with excessive water drinking before pelvic ultrasound examination,⁶ and after exercise.⁷ It has also been reported following attempts to treat a hang-over.⁹

Water intoxication with prolonged exercise has been reported in marathon and other long distance runners,⁷ who may drink up to 10 litres of fluid during a race. Exercise itself causes release of antidiuretic hormone and blood flow to the kidneys is greatly reduced during strenuous exercise in high ambient temperatures, leading to oliguria and water retention. Reduced mesenteric blood flow during exercise could delay the absorption of fluid until rest is taken. Many dancers at raves continue for prolonged periods without rest and similar physiological changes are to be expected.

Hyponatraemia itself has been proposed as a cause of rhabdomyolysis both after exertion and in psychiatric patients.^{4,7-9} In our patient there were several possible predisposing factors for the development of rhabdomyolysis including ingestion of ecstasy, hyperpyrexia, prolonged seizures, prolonged exercise and the hyponatraemia itself.

Final diagnosis

Severe hyponatraemia due to water intoxication at a rave.

Keywords: hyponatraemia, ecstasy, rave, water intoxication

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