

Hyperosmolar Hyperglycemic State

Hyperosmolar hyperglycemic state, also known as HHS or HHNK, is a state of extreme glucose toxicity. It is characterized by the presence of insulin alongside increased serum osmolality. Other characteristics include blood glucose levels above 600 mg/dL without significant acidosis or ketosis. Clinical features include severe dehydration, altered neurological status, tachycardia and hypotension. Management includes IV fluids, insulin, and the treatment of the underlying disorder.



PLAY PICMONIC

Characteristics

Insulin Present

[Insect-syringe](#)

In HHS, insulin is present which prevents lipolysis and ketogenesis. Lipolysis is the breakdown of fat which produces acid as a byproduct. Ketogenesis is the breakdown of fatty acids which produces ketones as a byproduct.

Increased Serum Osmolality

[Thick as Mud](#)

Serum osmolality is increased due to hyperglycemia induced polyuria leading to a state of severe dehydration. This state of severe dehydration leads to the symptoms of HHS.

Glucose \geq 600 mg/dL

[Hiker-glue-bottle 6-sax](#)

Patients with hyperosmolar hyperglycemic state may have glucose levels of 600mg/dl or more. This severe glucose level leads to glucose toxicity and has a large osmotic effect. Patients have pronounced glucosuria as well, which leads to polyuria.

No Significant Acidosis or Ketosis

[Police Blocking Acidic-lemon and Keys](#)

Lipolysis and ketogenesis does not occur in HHS, so acidosis and ketones are not present.

Clinical Features

Severe Dehydration

[Dehydrated David](#)

Patients present with a dry parched mouth and extreme thirst due to polyuria, a symptom of hyperglycemia.

Altered Neurological Status

[Nervous Party Man with Delta-halos](#)

Hyperosmolar hyperglycemic state may induce confusion, weakness, trouble talking, seizures, hallucinations, coma, or signs and symptoms that mimic a stroke.

Tachycardia and Hypotension

[Tack-heart-card and Hippo-BP](#)

Tachycardia and hypotension occur as a compensatory mechanism to the decreased blood volume and cardiac output. This decrease in body fluid is due to the polyuria and excessive dehydration of HHS.

Management

IV Fluids**IV Fluid**

Rehydrate patients slowly to prevent cerebral edema. Be cautious when rehydrating the elderly, CHF patients, and renal disease patients.

Insulin**Insect-syringes**

Patients in HHS aren't producing enough insulin to counteract the hyperglycemia, so insulin must be administered.

Treat Underlying Disorder**Treat-pill Underlying-roots**

Treat the underlying cause of HHS. Possible precipitating factors of HHS include burns, severe diarrhea, medications, uncontrolled diabetes, or myocardial infarction.