CONDITION

# Osmotic diuresis

Osmotic diuresis is increased urination caused by substances drawing extra water into the urine.

**WHAT IT IS**
Excess urine caused by dissolved substances retaining water

**BODY SYSTEM**
Kidneys and urinary system

**MAIN SYMPTOMS**
Large urine volumes, thirst, nighttime urination, dizziness

**WHAT CAUSES IT**
Excess glucose or another solute in urine

**HOW IT IS DIAGNOSED**
Measured urine volume and blood and urine tests

**MAIN TREATMENT**
Correcting the cause and replacing fluids and electrolytes

**CAN IT BE CURED?**
Sometimes - resolves when the cause is corrected

**IS IT AN EMERGENCY?**
Sometimes - with confusion, fainting, or severe dehydration

**LONG-TERM OUTLOOK**
Usually resolves after the underlying cause is corrected

## Overview

Osmotic diuresis means making more urine because a dissolved substance in the kidneys is pulling water into the urine. It is a body process or condition, not a disease by itself.

Your kidneys normally filter the blood and then return needed water and substances to the body. During osmotic diuresis, an unusually large amount of a substance remains inside the kidney tubules, the small channels that become urine. Water stays with that substance instead of being reabsorbed.

The dissolved substance is called a solute . Glucose is the most common example. When blood glucose is very high, the kidneys may be unable to reabsorb all the filtered glucose. Glucose then enters the urine and carries water with it.

Some medicines, including mannitol and sodium-glucose cotransporter-2 medicines, can also increase glucose or other solutes in the urine. In some situations, this effect is expected and medically useful.

Osmotic diuresis matters because prolonged water loss can cause dehydration and changes in sodium, potassium, and other electrolytes. It can also be an important sign of uncontrolled diabetes or another condition needing treatment.

## Symptoms

The main feature is polyuria , which means passing an unusually large total volume of urine. This is different from going to the toilet often but passing only small amounts each time.

Symptoms may include:

Symptoms related to the underlying cause may occur as well. For example, high blood glucose can cause blurred vision, increased hunger, weight loss, nausea, or repeated infections.

Mild osmotic diuresis caused by a medicine may be noticeable without causing serious dehydration. More severe fluid loss can lead to a fast heartbeat, low blood pressure, reduced alertness, or fainting.

- Passing large amounts of pale or moderately concentrated urine
- Needing to urinate during the night
- Strong or ongoing thirst
- Dry mouth
- Tiredness or weakness
- Dizziness, especially when standing
- Headache or difficulty concentrating

## Causes and risk factors

High blood glucose is a common cause. When the glucose concentration rises beyond what the kidneys can reabsorb, glucose spills into the urine. This may happen with previously unrecognized diabetes, diabetes that is not adequately controlled, or a severe hyperglycemic crisis.

Other possible causes include:

The chance of dehydration is greater if you cannot replace the lost fluid. Older adults, young

children, and people who are vomiting, have diarrhea, cannot drink independently, or have limited access to water may be affected more quickly.

Osmotic diuresis is not the same as taking a standard "water pill like furosemide or hydrochlorothiazide ." Many diuretics increase urine production by changing how the kidneys handle sodium, but they do not always produce a classic osmotic diuresis.

- SGLT2 medicines: These diabetes, heart, and kidney medicines deliberately cause some glucose to leave through the urine
- Mannitol: This is an intravenous medicine used in certain hospital settings to draw water into the urine
- Large solute loads: Substances such as sodium or certain medical fluids can sometimes increase urine solute levels
- Increased urea production: Urea is a waste product from protein breakdown; high amounts may contribute during severe illness, tube feeding, steroid treatment, or recovery from some kidney injuries
- Recovery from urinary blockage or acute kidney injury: The kidneys may temporarily pass large amounts of water and dissolved substances

## Diagnosis

A clinician first needs to confirm that the total urine volume is increased. Urinary frequency alone can also come from a bladder condition, urinary infection, pregnancy, prostate enlargement, or drinking large amounts of fluid.

You may be asked about how much you drink, how often you urinate, when the change began, and whether it started after a new medicine. Measuring all urine passed over a set period can help establish the actual volume.

Blood tests may check:

Urine testing can look for glucose, ketones, sodium, and other substances. Urine osmolality measures how concentrated the urine is and how many dissolved particles it contains. A large urine volume with substantial solute loss supports osmotic diuresis.

Results are interpreted together rather than through one test alone. This helps distinguish osmotic diuresis from water diuresis , in which the kidneys release mainly water. Water diuresis can occur after very high fluid intake or with diabetes insipidus, a separate condition involving the hormone that controls water balance.

- Glucose
- Sodium, potassium, and other electrolytes
- Kidney function
- Markers of dehydration
- Acid levels or ketones if a diabetic emergency is possible

## Treatment and management

Treatment focuses on the cause and on replacing fluid or electrolytes that have been lost.

If high blood glucose is responsible, care aims to bring glucose into a safer range while monitoring hydration, potassium, sodium, and kidney function. Severe hyperglycemia may need hospital treatment with intravenous fluid and insulin. Changes must be made carefully because glucose and electrolyte levels can shift during treatment.

If a medicine is contributing, the expected benefit is weighed against the amount of fluid loss. Do not stop insulin, an SGLT2 medicine, a diuretic, or another prescribed treatment without medical advice. A clinician may review the dose, timing, other medicines, kidney function, and your ability to remain hydrated.

Mannitol-induced diuresis is usually intentional and is monitored in a hospital. Staff measure urine output, blood pressure, electrolytes, and kidney function to reduce the risk of excessive fluid loss.

Drinking may be enough to replace mild losses when you are otherwise well and able to respond to thirst. Significant dehydration or major electrolyte changes may require intravenous fluids. The type and speed of replacement are based on blood tests, heart and kidney health, and the cause of the diuresis.

## Complications

The main complication is dehydration. Losing more water than you take in reduces the amount of fluid circulating through the body.

Possible complications include:

When uncontrolled diabetes is the cause, osmotic diuresis can be part of diabetic ketoacidosis , often called DKA, or hyperosmolar hyperglycemic state , called HHS. These are medical emergencies involving severe hyperglycemia, dehydration, and other metabolic changes.

Osmotic diuresis itself does not usually cause lasting damage once the cause and fluid losses are corrected. The longer-term risk is mainly determined by the underlying condition and how severe the dehydration becomes.

- Low blood pressure and fainting
- Reduced blood flow to the kidneys and acute kidney injury
- High or low sodium levels
- Potassium disturbances that can affect muscles or heart rhythm
- Worsening weakness, confusion, or reduced alertness

## Prevention

Osmotic diuresis cannot always be prevented. It may happen during an acute illness, recovery from kidney injury, or treatment with a medicine designed to increase solute loss through the urine.

If you have diabetes, following your glucose-monitoring and sick-day plan may help identify rising glucose before severe dehydration develops. Take medicines as directed and arrange a review if you develop a major change in thirst or urine output.

If you take an SGLT2 medicine, ask for clear instructions about what to do during vomiting, fasting, surgery, or serious illness. These medicines have important benefits for many people, but temporary changes may sometimes be needed under medical guidance.

Avoid trying to prevent osmotic diuresis simply by restricting fluids. Unless a clinician has told you to limit fluids for another condition, restriction can make dehydration worse.

## Living with it and what to expect

Osmotic diuresis is often temporary. Urine output usually moves back toward your normal level when the excess solute is removed or the underlying problem is controlled. Recovery may take hours to days in an acute episode, although the timing is influenced by the cause and the severity of dehydration.

If a medicine intentionally causes glucose loss in the urine, a mild increase in urination may continue while you take it. This does not necessarily mean something is wrong. Persistent thirst, nighttime disruption, dizziness, or difficulty keeping up with fluid losses should still be reviewed.

Ongoing osmotic diuresis from poorly controlled diabetes may come and go as glucose levels change. Managing the diabetes is more important than treating urination as an isolated symptom.

After a significant episode, follow-up may include repeat electrolyte, glucose, and kidney-function tests. Routine follow-up is also appropriate if large urine volumes continue, symptoms return, or the cause remains uncertain.

Most people do not need permanent treatment for osmotic diuresis itself. Long-term care is directed at the condition or medicine producing it.

## When to get medical help

Seek emergency help now if heavy urination or intense thirst occurs with:

If you have diabetes, follow your emergency and sick-day plan. Do not delay urgent care while trying to correct severe symptoms with extra drinks or additional medicine on your own.

Arrange same-day medical advice for a sudden major increase in urine, persistent dizziness, a very dry mouth, positive ketones, or high glucose that is not improving according to your established plan.

A routine appointment is appropriate for ongoing large urine volumes, repeated nighttime urination, or increased thirst without urgent symptoms. Keep a record of fluid intake, urine frequency, glucose readings if available, and recent medicine changes.

- Confusion, unusual drowsiness, or difficulty waking
- Fainting or a seizure
- Deep or unusually rapid breathing
- Repeated vomiting or inability to keep fluids down
- Severe weakness or signs of shock, such as cold, clammy skin
- Very high glucose or ketones together with symptoms of DKA or HHS

## Common questions

Is osmotic diuresis the same as diabetes?

No. Osmotic diuresis is a process that can be caused by high blood glucose, but it can also result from medicines or other solutes. Its presence does not by itself confirm diabetes.

Does osmotic diuresis go away?

It often resolves when the excess glucose or other solute is reduced and lost fluid is replaced. If a medicine is intentionally producing the effect, increased urination may continue while the treatment is used.

Can SGLT2 medicines cause osmotic diuresis?

Yes. These medicines cause the kidneys to release more glucose into the urine, which can draw extra water with it. A mild increase in urination may be expected. Marked thirst, dizziness, vomiting, or illness needs medical advice.

Is osmotic diuresis the same as diabetes insipidus?

No. Diabetes insipidus causes the kidneys to release large amounts of dilute urine because of a problem with the hormone controlling water balance or the kidneys' response to it. It is unrelated to blood glucose despite the similar name.

How do I know if I am making too much urine?

Passing urine often does not always mean the total volume is high. Measuring urine over a set period can help. If the change is persistent or comes with strong thirst, nighttime urination, dizziness, or high glucose, arrange an assessment.

Will drinking more water stop osmotic diuresis?

Drinking can replace some lost water, but it does not remove the underlying cause. Severe dehydration, vomiting, confusion, or major glucose and electrolyte changes need medical treatment rather than fluid intake alone.

## Sources


- MSD Manual Professional Edition. Polyuria . Overview of causes, assessment, and differentiation of solute and water diuresis.
- Umpierrez GE, Davis GM, ElSayed NA, and colleagues. Hyperglycemic Crises in Adults With Diabetes: A Consensus Report . Diabetes Care . 2024;47(8):1257-1275.
- Liamis G, Liberopoulos E, Barkas F, Elisaf M. Diabetes mellitus and electrolyte disorders . World Journal of Clinical Cases . 2014;2(10):488-496.
- National Institute of Diabetes and Digestive and Kidney Diseases. Diabetes Insipidus . Explanation of water-balance disorders and high-volume dilute urine.
- US National Library of Medicine, DailyMed. Mannitol injection prescribing information . Clinical uses, osmotic effects, monitoring, and fluid and electrolyte risks.