CONDITION

# Baking soda overdose

Learn how too much baking soda can affect the body's salt and acid balance, which symptoms need urgent care, and how an overdose is evaluated and treated.

**WHAT IT IS**
Poisoning from too much sodium bicarbonate

**BODY SYSTEM**
Digestive system, brain, muscles and heart

**MAIN SYMPTOMS**
Nausea, vomiting, abdominal bloating, confusion

**WHAT CAUSES IT**
Excessive sodium bicarbonate ingestion

**HOW IT IS DIAGNOSED**
Blood tests and blood gas test

**MAIN TREATMENT**
Supportive care and electrolyte correction

**CAN IT BE CURED?**
Sometimes - lasting harm depends on severity

**IS IT AN EMERGENCY?**
Sometimes - trouble breathing or severe abdominal pain

**LONG-TERM OUTLOOK**
Lasting harm depends on severity and prompt treatment

## Overview

Baking soda is sodium bicarbonate, a chemical used in cooking, cleaning, some antacid products, and certain medical treatments. Although small amounts are commonly used in food, swallowing too much can cause poisoning.

Sodium bicarbonate contains sodium and acts as an alkali, meaning it reduces acidity. A large amount can give the body more sodium and bicarbonate than the kidneys can safely remove. This may disturb the body's fluid, salt, and acid balance.

One important effect is metabolic alkalosis , which means the blood becomes too alkaline. An overdose may also cause high blood sodium, low blood potassium, dehydration, fluid overload, or abnormal heart rhythms.

Baking soda releases carbon dioxide gas when it mixes with stomach acid. A large amount can therefore cause rapid gas buildup and severe stomach swelling. Rarely, pressure from this gas can damage the stomach, especially after a large meal.

The effects depend on the amount swallowed, whether it was taken all at once or repeatedly, and the person's age, kidney function, heart health, and other medical conditions. There is no reliable household amount that can be used to judge whether an exposure is safe.

If someone may have swallowed too much baking soda, contact Poison Help in the United States at 1-800-222-1222 . Poison specialists can assess the exposure and explain what to do next. Do not wait for symptoms to appear.

## Symptoms

Early symptoms often involve the digestive system. They may include:

Changes in blood chemistry can affect the muscles, brain, breathing, and heart. Possible symptoms include weakness, tiredness, muscle cramps, twitching, tingling, headache, irritability, confusion, or unusual sleepiness.

A person with metabolic alkalosis may breathe more slowly as the body tries to hold on to acid in the form of carbon dioxide. However, breathing changes can have many causes and should not be interpreted at home.

High blood sodium may cause intense thirst, restlessness, confusion, muscle twitching, seizures, or loss of consciousness. Low potassium can contribute to muscle weakness, constipation, palpitations, and abnormal heart rhythms.

When to get emergency help

Call emergency services immediately if the person has:

Do not make the person vomit. Do not try to neutralize baking soda with vinegar, lemon juice, or another acid. The reaction can produce more gas and may worsen stomach pressure.

If the person is awake and stable, call Poison Help or the appropriate poison center where you live. Do not give food, drinks, or home remedies unless a poison specialist or healthcare professional recommends them.

- Nausea or vomiting
- Diarrhea
- Stomach discomfort, fullness, or bloating
- Increased thirst

- Frequent urination
- Trouble breathing
- Severe or rapidly worsening abdominal pain or swelling
- Repeated vomiting, especially with an inability to keep fluids down
- Chest pain, fainting, or a very fast or irregular heartbeat
- A seizure
- Severe confusion, extreme sleepiness, or loss of consciousness
- Vomit containing blood or material that looks like coffee grounds

## Causes and risk factors

An overdose can happen after one large exposure or after repeated use over hours or days. Common situations include using excessive baking soda as a homemade antacid, confusing a household spoon with a measuring spoon, or repeatedly taking it without accounting for the sodium and bicarbonate already consumed.

Some people use baking soda in an attempt to improve athletic performance, change urine test results, treat indigestion, or manage another health concern. These uses can involve concentrated or repeated amounts and may lead to poisoning.

Commercial medicines may also contain sodium bicarbonate. Taking more than directed, combining several sodium-containing products, or using both a medicine and household baking soda can increase the total exposure. Accidental ingestion by a child is another possible cause.

The risk of serious effects may be higher in people who have:

Risk also depends on whether other substances were swallowed. The product container matters because baking soda, baking powder, and household cleaners are not the same. Baking powder contains additional ingredients, while some cleaning products may contain chemicals other than sodium bicarbonate.

- Kidney disease, because the kidneys remove extra sodium and bicarbonate
- Heart failure or another condition that makes fluid overload more likely
- High blood pressure or a need to limit sodium
- Ongoing vomiting, dehydration, or low blood potassium
- A condition or medicine that already changes fluid, electrolyte, or acid balance

- A very young or older age

## Diagnosis

Healthcare professionals first ask what product was taken, how much may have been swallowed, when it happened, and whether it was taken once or repeatedly. They will also ask about symptoms, medical conditions, medicines, supplements, and other possible exposures.

Bring the package or a clear photograph of its label if this can be done safely. Do not delay emergency care while searching for it.

An examination may include checks of blood pressure, pulse, breathing, temperature, alertness, hydration, and abdominal swelling or tenderness. The healthcare team may monitor oxygen levels and heart rhythm.

Blood tests can measure sodium, potassium, chloride, bicarbonate, glucose, and kidney function. A blood gas test measures the blood's acidity and carbon dioxide level. These results help determine whether metabolic alkalosis is present and how severe it is.

An electrocardiogram, or ECG, records the heart's electrical activity. It may be used when there are significant electrolyte changes, palpitations, fainting, or other concerns about heart rhythm.

Severe abdominal pain or swelling may require imaging to look for marked stomach distention, leakage, or another cause of the symptoms. Not every exposure requires all of these tests. Poison specialists and clinicians choose testing based on the circumstances.

## Treatment and management

Treatment begins with stopping further exposure and getting advice from a poison center or healthcare professional. Management depends on symptoms, test results, the amount involved, and the person's overall health.

A person without symptoms after a small, clearly defined exposure may sometimes be observed at home under poison-center guidance. Other people need evaluation in an emergency department, especially if the amount is uncertain, symptoms are present, repeated doses were taken, or kidney or heart disease is involved.

In a medical setting, treatment is mainly supportive. This means protecting breathing and circulation while correcting the specific problems caused by the overdose.

The care team may give intravenous fluids when appropriate. Fluids containing chloride can

help the kidneys remove excess bicarbonate in some forms of metabolic alkalosis. Potassium or other electrolytes may be replaced when blood tests show a deficiency. These treatments require monitoring because both under-treatment and overcorrection can be harmful.

People with fluid overload, kidney failure, severe alkalosis, or major sodium abnormalities may need more specialized treatment. In uncommon severe cases, dialysis may be considered to remove excess substances and correct fluid or electrolyte problems. Treatment decisions are individualized and may involve a medical toxicologist, kidney specialist, or critical care team.

Abdominal swelling and pain are monitored closely because carbon dioxide gas can build up after baking soda reacts with stomach acid. Sudden severe pain, a rigid abdomen, or signs of internal injury require urgent surgical assessment.

There is no recommended home antidote. Inducing vomiting, drinking an acid, or taking additional medicines without professional guidance can create new problems or delay effective care.

## Complications

Most complications result from changes in acid balance, electrolytes, body fluid, or pressure inside the stomach.

Severe metabolic alkalosis can reduce blood flow to tissues and interfere with normal nerve, muscle, and heart function. It may contribute to confusion, muscle spasms, seizures, or abnormal heart rhythms.

High sodium can pull water out of cells, including brain cells. If severe, this can cause major neurological symptoms. Low potassium may cause significant weakness and heart rhythm changes.

The sodium load can lead to fluid retention. This is especially concerning for someone with kidney disease or heart failure because extra fluid may worsen swelling or breathing problems.

Repeated vomiting can worsen dehydration and lower chloride and potassium levels. This may make the alkalosis harder for the body to correct.

Rapid carbon dioxide production can cause marked stomach distention. Stomach rupture is rare but serious. Warning signs include sudden severe abdominal pain, a hard or very swollen abdomen, faintness, and difficulty breathing.

Kidney injury can occur because of dehydration, reduced blood flow, or severe electrolyte disturbance. The chance of lasting harm depends on the severity of the exposure and how quickly complications are recognized and treated.

## Follow up

Follow-up needs vary. Someone evaluated in an emergency department may be asked to have repeat blood tests to confirm that sodium, potassium, bicarbonate, and kidney function have returned to an acceptable range. Keep this follow-up even if symptoms have improved, because blood chemistry changes may persist after a person feels better.

After discharge, seek prompt medical advice for returning vomiting, worsening weakness, increasing thirst, new swelling, palpitations, or confusion. Severe abdominal pain, trouble breathing, fainting, seizures, or loss of consciousness require emergency help.

If baking soda was being used regularly for heartburn or indigestion, discuss the symptoms with a healthcare professional rather than restarting it on your own. Frequent heartburn may need evaluation, and other approaches may be safer depending on the person's health and medicines.

Review all antacids, supplements, and over-the-counter products with a pharmacist or clinician. Labels may list sodium bicarbonate even when the product is not called baking soda. People who need to limit sodium should pay particular attention to this ingredient.

Store baking soda and medicines where children cannot reach them. Keep products in their original containers so that the label and ingredients remain available if an exposure occurs.

## Sources

- U.S. National Library of Medicine. Baking soda overdose . MedlinePlus Medical Encyclopedia.
- Health Resources and Services Administration. Poison Help . U.S. Department of Health and Human Services.
- Merck Manual Professional Edition. Metabolic Alkalosis . Merck & Co., Inc.
- U.S. National Library of Medicine. Sodium Bicarbonate tablet: drug label information . DailyMed.
- Al-Abri SA, Kearney T. Baking soda misuse as a home remedy: case experience of the California Poison Control System . Journal of Clinical Pharmacy and Therapeutics . 2014;39(1):73-77.
- Fitzgibbons LJ, Snoey ER. Severe metabolic alkalosis due to baking soda ingestion: case reports of two patients with unsuspected antacid overdose . Journal of Emergency Medicine . 1999;17(1):57-61.