CONDITION

Milk-alkali syndrome

Milk-alkali syndrome is high blood calcium with alkaline blood and kidney injury, usually caused by taking too much calcium carbonate.

WHAT IT IS
High calcium, alkaline blood, and kidney dysfunction from excess intake

BODY SYSTEM
Kidneys, blood chemistry, digestive and nervous systems

MAIN SYMPTOMS
Nausea, constipation, frequent urination, confusion

WHAT CAUSES IT
Excess calcium with absorbable alkali

HOW IT IS DIAGNOSED
Calcium, bicarbonate, kidney tests, and intake history

MAIN TREATMENT
Stopping excess intake, fluids, and blood-test monitoring

CAN IT BE CURED?
Yes - usually resolves when excess intake stops

IS IT AN EMERGENCY?
Sometimes - confusion, collapse, or abnormal heartbeat

LONG-TERM OUTLOOK
Usually resolves, but chronic kidney damage can persist

Overview

Milk-alkali syndrome is a condition caused by taking in more calcium and absorbable alkali than the body can safely handle. An alkali is a substance that reduces acidity. Calcium carbonate, found in many calcium supplements and antacids, provides both calcium and alkali.

The condition produces three linked problems:

The name comes from an older treatment for stomach ulcers that used large amounts of milk and alkaline powders. Today, the condition is more often connected with calcium carbonate taken for indigestion, bone health, or another medical reason. It is also called calcium-alkali syndrome.

Milk-alkali syndrome matters because high calcium and changes in kidney function can affect

your digestion, thinking, muscles, fluid balance, and heartbeat. Mild cases may cause few symptoms. More serious cases need hospital treatment.

The condition is often reversible when it is recognised early and the source of excess calcium and alkali is removed. However, kidney damage can remain when exposure has continued for a long time.

- High calcium in the blood, called hypercalcaemia
- Blood that is too alkaline, called metabolic alkalosis
- Reduced kidney function or kidney injury

Symptoms

Symptoms can develop over days or build more gradually. They are often vague and can resemble many other conditions.

Possible symptoms include:

High calcium makes the kidneys release more water into the urine. This can cause dehydration, which may further reduce kidney function and raise the calcium level.

Long-standing cases may be noticed through blood tests before clear symptoms develop. Some people seek care because they feel generally unwell, while others are being investigated for worsening kidney function.

Confusion, collapse, marked drowsiness, or a noticeably abnormal heartbeat can indicate a severe calcium disturbance and need urgent assessment.

- Nausea, vomiting, or reduced appetite
- Constipation or abdominal discomfort
- Strong thirst and frequent urination
- Tiredness or muscle weakness
- Headache, irritability, or difficulty concentrating
- Drowsiness or confusion

Causes and risk factors

Milk-alkali syndrome usually results from taking large or repeated amounts of calcium carbonate. This may come from calcium supplements, chewable antacids, or several products

used at the same time.

Calcium carbonate is a common source because it contains both parts involved in the condition: calcium and an alkali that the body can absorb. Other combinations of calcium and absorbable alkali may also cause it.

A cycle can then develop. High calcium reduces the kidneys' ability to remove calcium and concentrate urine. Water and salt are lost, causing dehydration. Reduced kidney filtration allows more calcium and alkali to remain in the blood. The alkaline blood also encourages the kidneys to retain calcium.

Not everyone taking calcium carbonate develops the condition. Factors that can increase susceptibility include:

Milk itself is rarely the main cause in modern cases. The condition is not related to lactose intolerance or milk allergy.

Do not stop prescribed medicines solely because they appear on this list. A healthcare professional can review how your medicines and supplements work together.

- Reduced kidney function
- Dehydration from vomiting, diarrhoea, fever, or poor fluid intake
- Taking more than one calcium-containing supplement or antacid
- Vitamin D use, which can increase calcium absorption
- Medicines that reduce calcium loss in urine, such as thiazide diuretics
- Medicines that can reduce blood flow through the kidneys, including some anti-inflammatory painkillers like ibuprofen or naproxen
- Older age, when kidney function may be lower

Diagnosis

Diagnosis is based on blood tests together with a careful review of medicines, supplements, antacids, and dietary products.

Tests typically show:

Parathyroid hormone helps control calcium. When calcium is high, this hormone would normally fall. Measuring it helps separate milk-alkali syndrome from an overactive parathyroid gland.

Other blood tests may check phosphate, magnesium, potassium, vitamin D, and other measures of kidney function. An electrocardiogram, or ECG, may be used to check the heart's

electrical activity when calcium is markedly raised or symptoms suggest a rhythm problem.

The history is essential. Bring or photograph the labels of all supplements, antacids, powders, vitamins, and non-prescription medicines you use. Calcium may be present in several products under different brand names.

There is no single test that proves milk-alkali syndrome by itself. Other causes of high calcium, including parathyroid conditions, certain cancers, and some medicines, may need to be excluded.

- A raised total or ionised calcium level
- Increased bicarbonate or an alkaline blood pH
- Evidence of reduced kidney filtration, such as raised creatinine
- A low or appropriately suppressed parathyroid hormone level

Treatment and management

Treatment starts with stopping the excess source of calcium and alkali. If the product was prescribed, a healthcare professional can advise whether it should be stopped, reduced, or replaced. Avoid trying to correct the problem by switching to another calcium product without checking its ingredients.

Mild cases may improve after the source is removed and fluid levels are restored. Repeat blood tests are used to make sure calcium, bicarbonate, and kidney function are moving toward a safer range.

People with significant symptoms, dehydration, severe hypercalcaemia, or kidney injury may need hospital care. Treatment commonly includes intravenous saline, which is salt water given through a vein. This replaces lost fluid and helps the kidneys remove calcium.

Other treatments are selected according to the severity and cause. A medicine called calcitonin may sometimes be used to lower calcium temporarily. Medicines called bisphosphonates are commonly used for some other causes of high calcium, but they are not routinely needed for milk-alkali syndrome and may cause calcium to fall too low after the excess intake stops.

A diuretic like furosemide or hydrochlorothiazide , which increases urine production, is not a routine first treatment. It may be considered after fluid replacement if excess fluid becomes a concern. In uncommon, severe cases involving major kidney failure or calcium that cannot be controlled safely, dialysis may be needed to filter the blood.

Calcium can occasionally fall below normal during recovery because the parathyroid glands

have been temporarily suppressed. This is one reason follow-up blood testing matters.

Complications

Acute kidney injury is a central part of the condition. Kidney function often improves with treatment, but prolonged exposure can lead to chronic kidney disease.

Other possible complications include:

The likelihood of lasting problems is influenced by how high the calcium became, how long the condition was present, and whether kidney damage was already established.

- Calcium deposits within the kidneys, called nephrocalcinosis
- Kidney stones
- Severe dehydration
- Abnormal heart rhythms
- Confusion, reduced consciousness, or, rarely, seizures
- Low calcium during recovery

Prevention

Milk-alkali syndrome is usually preventable because it is caused by excess intake rather than an inherited change.

Check the active ingredients in supplements and antacids. Different products may all contain calcium carbonate, so using them together can raise your total intake without it being obvious.

Use calcium-containing products only as directed. More calcium does not necessarily provide more benefit. If you need frequent antacids, seek advice about the cause of the symptoms rather than repeatedly increasing the amount.

Tell your healthcare team and pharmacist about all non-prescription products you use, especially if you have reduced kidney function or take vitamin D, a thiazide diuretic, or medicines that can affect the kidneys.

If vomiting, diarrhoea, or another illness is making you dehydrated, ask for advice about medicines and supplements that may affect your kidneys or calcium level. Prevention cannot be guaranteed, but reviewing the full combination of products lowers the chance of accidental excess.

Living with it and what to expect

Once excess calcium and alkali are stopped, blood calcium and fluid balance often improve over days. Kidney function may take longer to recover. The timing is not the same for everyone, so repeat blood tests are more useful than symptoms alone.

Most people whose condition is found early can return to their usual activities after recovery. Long-term treatment for the syndrome itself is not normally needed if calcium levels and kidney function return to normal and the trigger is avoided.

If chronic kidney damage has developed, ongoing monitoring may be necessary. This can include blood pressure checks and tests of kidney function, calcium, and other salts in the blood. The original symptoms may resolve even when some reduction in kidney function remains.

The condition can return if high calcium and alkali intake begins again. Keep an up-to-date list of your supplements and antacids, and check before restarting the product linked to the episode. If calcium is still needed for another reason, a healthcare professional can help identify an appropriate approach.

When to get medical help

Arrange a routine appointment if you regularly use calcium carbonate and develop ongoing constipation, nausea, increased thirst, frequent urination, unusual tiredness, or difficulty concentrating. These symptoms have many possible causes, but blood tests can check calcium and kidney function.

Seek same-day medical advice if you have repeated vomiting, signs of dehydration, much less urine than usual, worsening weakness, or marked drowsiness. Prompt assessment is also appropriate if a recent blood test shows high calcium or worsening kidney function.

Call emergency services if you or someone with you has:

Bring supplement and medicine containers to the assessment if this can be done without delaying care.

- New severe confusion or cannot be woken normally
- A seizure
- Collapse or fainting
- Chest pain with a fast, slow, or irregular heartbeat

- Severe weakness that makes standing or walking unsafe

Common questions

Is milk-alkali syndrome caused by drinking milk?

Usually not. The name comes from an old ulcer treatment involving milk and alkaline powders. Modern cases are more often linked to calcium carbonate supplements or antacids. Ordinary milk intake alone is unlikely to cause the condition.

Can calcium antacids cause milk-alkali syndrome?

Yes. Calcium carbonate antacids can cause it when enough is taken, particularly when combined with calcium supplements, vitamin D, dehydration, reduced kidney function, or certain medicines. Frequent indigestion that requires repeated antacid use should be assessed rather than managed by continually increasing the amount.

How much calcium is too much?

There is no single amount that causes the condition in everyone. Risk is affected by kidney function, hydration, other medicines, vitamin D use, and the total calcium from all products. Follow the product or prescription instructions and ask a pharmacist to help calculate your combined intake if you use several products.

Is this the same as lactose intolerance or a milk allergy?

No. Lactose intolerance is difficulty digesting the sugar in milk and usually causes bloating, wind, or diarrhoea. Milk allergy is an immune reaction to milk proteins. Neither causes the characteristic combination of high calcium, alkaline blood, and kidney injury.

Will my kidneys recover?

Kidney function often improves after the cause is removed and dehydration is treated. Recovery may be incomplete if the condition was prolonged or chronic kidney disease was already present. Follow-up blood tests show whether kidney function has returned to its previous level.

Can milk-alkali syndrome come back?

Yes. It can return if excessive calcium and absorbable alkali are taken again. Reviewing all supplements and antacids before restarting them can reduce this risk.

Sources

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