CONDITION

Osteomalacia

Osteomalacia is a condition in which adult bones become soft because they are not mineralised properly.

WHAT IT IS
Soft, weak adult bones caused by poor mineralisation

BODY SYSTEM
Bones and muscles

MAIN SYMPTOMS
Bone pain, muscle weakness, difficulty walking, fractures

WHAT CAUSES IT
Usually vitamin D, calcium, or phosphate deficiency

HOW IT IS DIAGNOSED
Blood tests and imaging; bone biopsy if uncertain

MAIN TREATMENT
Replacing deficiencies and treating the underlying cause

CAN IT BE CURED?
Sometimes - often improves when the cause is corrected

IS IT AN EMERGENCY?
Sometimes - sudden severe pain may mean a fracture

LONG-TERM OUTLOOK
Often good when the underlying cause is treatable

Overview

Osteomalacia is a condition in which adult bones become soft and weaker than normal. It happens when new bone does not take up enough minerals, mainly calcium and phosphate. This process is called poor mineralisation.

Vitamin D helps your body absorb calcium and phosphate and maintain healthy bones. A lack of vitamin D is the most common cause of osteomalacia, but digestive, kidney, liver, genetic, and medication-related problems can also cause it.

Osteomalacia is not the same as osteoporosis. In osteoporosis, the amount and internal structure of bone are reduced. In osteomalacia, bone is present but has not hardened properly. A person can have both conditions.

The condition matters because it can cause persistent pain, weak muscles, difficulty walking, and fractures. Many cases improve when the cause is found and treated. Less common forms may need long-term specialist care.

In children, poor mineralisation of growing bones is called rickets rather than osteomalacia.

Symptoms

Osteomalacia may develop slowly. Early symptoms can be mild or mistaken for arthritis, ageing, or general weakness. Some people have no obvious symptoms until blood tests or imaging find a problem.

Bone pain is often dull and widespread. It may affect the lower back, hips, pelvis, ribs, or legs. The bones can feel tender when pressed.

Muscle weakness usually affects muscles near the centre of the body, especially around the hips and thighs. You may notice difficulty getting out of a chair, climbing stairs, or walking. Some people develop a waddling walking pattern.

Common features include:

Severe mineral abnormalities can sometimes cause muscle cramps, tingling, or spasms. These symptoms need medical assessment because they can also have other causes.

- Dull, persistent pain in several bones
- Weakness around the hips, thighs, or shoulders
- Difficulty standing, climbing stairs, or walking
- Fractures after a minor injury or during ordinary activity

Causes and risk factors

Vitamin D deficiency is the most frequent cause. Your body obtains vitamin D from sunlight on the skin, food, and supplements. The liver and kidneys then change it into forms the body can use.

A deficiency can develop when there is limited sunlight exposure, very little vitamin D in the diet, or difficulty absorbing nutrients. Risk may be higher if you spend little time outdoors, cover most of your skin, or have darker skin, because more sunlight exposure is generally needed to produce the same amount of vitamin D.

Conditions that interfere with absorption include coeliac disease, inflammatory bowel disease,

pancreatic disorders, and some types of weight-loss surgery. Long-term liver or kidney conditions can affect how vitamin D and minerals are processed.

Some medicines increase the breakdown of vitamin D or change mineral balance. Examples include certain antiseizure medicines. Do not stop a prescribed medicine because of this possibility; its risks and benefits need to be reviewed by the clinician who prescribed it.

Osteomalacia can also result from low phosphate levels. This may happen when the kidneys release too much phosphate into the urine. Some phosphate-wasting conditions are inherited. Rarely, a small tumour produces substances that cause phosphate loss.

Other uncommon causes include inherited problems affecting vitamin D, phosphate, or bone mineralisation. These forms cannot be prevented through diet or sunlight alone.

Diagnosis

Symptoms alone cannot confirm osteomalacia. Your medical history, examination, blood results, and imaging findings are considered together.

Blood tests usually measure:

Alkaline phosphatase is an enzyme that often rises when bone mineralisation is impaired. Calcium may be low or normal, so a normal calcium result does not rule out osteomalacia.

Urine tests may show whether the kidneys are losing calcium or phosphate. If phosphate is low, further blood and urine tests can help identify why.

X-rays may show fractures or narrow areas of weakened bone called Looser zones, sometimes described as pseudofractures. A bone-density scan can show reduced bone density, but it cannot by itself distinguish osteomalacia from osteoporosis.

A bone biopsy is rarely needed. It involves removing a small sample, usually from the pelvis, to examine how well the bone is mineralised. It may be considered when the diagnosis remains uncertain or the cause is unusual.

- Vitamin D, calcium, phosphate, and alkaline phosphatase
- Parathyroid hormone, which helps control calcium
- Kidney and sometimes liver function

Treatment and management

Treatment aims to restore normal mineralisation and address the reason it became abnormal.

The approach therefore differs according to the cause.

Osteomalacia caused by vitamin D deficiency is usually treated with vitamin D replacement. Calcium may also be recommended when dietary intake is low or blood calcium is reduced. The form, amount, and duration depend on blood results, absorption, kidney function, and other health conditions.

Do not take large amounts of vitamin D, calcium, or phosphate without medical advice. Excessive replacement can cause high calcium levels, kidney stones, or kidney damage.

If a digestive condition is preventing absorption, that condition may need treatment as well. People with substantial malabsorption, liver disease, or kidney disease may need different forms of vitamin D and closer monitoring.

Phosphate-wasting osteomalacia requires specialist assessment. Treatment may include replacing phosphate, using an active form of vitamin D, or using a targeted medicine for certain inherited conditions. If a phosphate-wasting tumour is found, removing it may correct the mineral problem.

Blood and sometimes urine tests are repeated during treatment. These tests show whether vitamin D, calcium, phosphate, and alkaline phosphatase are moving toward safer levels. They also help prevent complications from replacement treatment.

Pain may ease as the bones heal, although this can take time. Suitable pain relief, help with walking, and physiotherapy may be useful. Exercise is usually increased gradually once fractures have been excluded and movement is considered safe.

A fracture may need bracing, restricted weight-bearing, or an operation, depending on its location and severity.

Complications

Untreated osteomalacia can lead to reduced mobility and repeated fractures. The hips, pelvis, ribs, spine, and leg bones may be affected. Long-standing severe disease can also cause changes in bone shape.

Weak muscles and an unsteady walking pattern can increase the chance of falling. Ongoing pain may interfere with sleep, work, and everyday activities.

Very low calcium can cause marked cramps, muscle spasms, seizures, or changes in heart rhythm. This is uncommon but requires urgent treatment.

Prevention

Some, but not all, cases of osteomalacia can be prevented.

Adequate vitamin D and calcium help maintain normal bone mineralisation. Follow local public health advice on vitamin D supplements, particularly if you have limited sun exposure or another recognised risk of deficiency. Foods that may provide vitamin D include oily fish, egg yolks, and fortified products. Calcium is found in dairy products and many fortified alternatives.

Sunlight can help your body make vitamin D, but prolonged unprotected exposure raises the risk of skin damage. The amount needed is affected by season, location, skin colour, clothing, and time outdoors, so there is no single safe exposure time for everyone.

Osteomalacia caused by inherited conditions cannot be prevented. Cases related to kidney, liver, or digestive conditions may not be fully preventable either. Regular monitoring can help detect mineral problems before substantial bone damage develops.

Living with it and what to expect

Recovery usually takes place over months rather than days. Muscle strength and general well-being may improve before bone pain has completely settled. Blood tests can also take time to return toward normal.

Fractures and pseudofractures heal more slowly than a simple vitamin deficiency corrects. Physiotherapy or temporary mobility support may be needed while the bones recover. Return to exercise is generally gradual.

When a nutritional deficiency is the cause and it can be corrected, the outlook is often good. Some people need ongoing vitamin D or calcium support to prevent the problem returning.

If osteomalacia is caused by malabsorption, kidney disease, phosphate wasting, or an inherited condition, long-term treatment and repeated monitoring may be necessary. Symptoms can still improve, but the underlying cause may remain.

Follow-up is used to check symptoms, walking ability, blood results, and any treatment effects. Keeping these appointments is important even if you begin to feel better.

When to get medical help

Arrange a routine medical appointment if you have persistent bone pain, unexplained muscle weakness, increasing difficulty climbing stairs, or a change in how you walk. These symptoms do not necessarily mean osteomalacia, but they deserve assessment.

Seek prompt medical advice if you have already been diagnosed and your pain is getting worse, you develop new cramps or tingling, or treatment is causing nausea, unusual thirst, frequent urination, or constipation. These can sometimes be signs of abnormal calcium levels.

Seek urgent medical care after a fall or injury if you have severe bone pain, visible deformity, or cannot use a limb normally. Sudden pain without a clear injury may also need urgent assessment because weakened bone can fracture during ordinary activity.

Call emergency services for a seizure, severe muscle spasms, breathing difficulty, collapse, or sudden confusion. These symptoms have many possible causes and should not be assessed at home.

Common questions

Is osteomalacia the same as osteoporosis?

No. Osteomalacia means bone is not mineralised and hardened properly. Osteoporosis means bone has become less dense and its internal structure is weaker. They can cause similar symptoms and may occur together, but their treatment is not identical.

Can osteomalacia be cured?

It can often be corrected when it is caused by a treatable vitamin D, calcium, or phosphate deficiency. The outlook is less straightforward when the cause is an inherited condition, chronic kidney disease, or continuing malabsorption. These forms may require lifelong management.

How long does osteomalacia take to heal?

Blood results may begin improving before the bones fully recover. Pain, weakness, and fractures can take several months to improve. Healing time is affected by the cause, severity, presence of fractures, and how well minerals can be absorbed.

Can low vitamin D cause osteomalacia?

Yes. Severe or prolonged vitamin D deficiency can prevent enough calcium and phosphate from reaching and hardening new bone. However, not everyone with a low vitamin D blood result has osteomalacia.

What does osteomalacia pain feel like?

It is often described as a dull, aching pain in several areas, such as the hips, pelvis, lower back, ribs, or legs. The bones may feel tender. Because many conditions cause similar pain, testing is needed to identify the cause.

Does osteomalacia affect children?

Poor mineralisation affects children differently because their bones are still growing. The condition is then called rickets. Children with suspected rickets need assessment focused on growth, bone development, diet, and possible inherited causes.

Sources

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