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Flat Feet

Flat feet are just as they sound - feet that are flatter on the undersurface (or plantar surface) than they should be, because the arches (insteps) have dropped. This can (but does not always) lead to pain and tiredness in the feet. It can also cause problems in the ankles, legs or back.

What are flat feet?

Flat feet occur when the normal foot arches have partially or completely collapsed. When the foot is put to the ground the inner or middle side of the foot comes down to the floor rather than remaining raised. This can cause the whole foot to roll inwards (this is called over-pronation).

What are the foot arches?

The underside of a normal adult foot has an upward curve in the middle and this is called an arch. In fact there are two main arches, one running lengthways down the foot and one running across the foot.

The arches are formed by the way in which the bones are held tightly together - particularly the bones of the midfoot. These bones are held firmly in place by tendons. Several tendons of the foot and lower leg are involved in forming the arches in this way. These tendons attach the bones of the midfoot to the heel and they pull together to hold parts of the underside of the foot up off the ground. The most important tendon involved in the job is the posterior tibial tendon, which runs from the back of the leg behind the ankle bone then under the foot to the midfoot.

Why do we have arches in our feet?

The feet are clever, flexible structures made of 26 bones and over 100 muscles, tendons and ligaments. The three parts of the foot, anatomically, are:

- Forefoot: made up of the toes and the five long bones or metatarsals.
- Midfoot: a collection of bones forming the arches of the foot.
- Hindfoot: the heel and ankle.

Ligaments, tendons and muscles run alongside these bones, bonding them together and allowing the many movements the foot can make.

The arches of the feet help us to stand, balance, walk, run and jump. This is because they add springiness and flexibility to the foot by allowing the middle part of the foot to spread and close. They help the foot to absorb the physical shock of landing and produce strength to push off and to adjust to balance and walk. They also help distribute the weight of the body evenly around the foot as we move.

What causes flat feet?

- Flat feet can be simply the way your feet are made, an abnormality present from birth. Flat feet can be inherited, just as we inherit other physical characteristics from our parents.
- Young children have flat feet anyway. The arches of the feet only appear when standing when they get older (although in a child the arch can sometimes be seen when the child stands on tiptoe).

Other causes of flat feet include

- Damaged, inflamed or torn tendons (particularly the posterior tibial tendon).
- Gradual stretch of the posterior tibial tendon (particularly common in women over 40. It is possible that wearing high heels for prolonged periods plays a part in this).
- Damage to the bones of the foot or ankle
- Conditions affecting the joints and soft tissues, including arthritis
- Some conditions affecting the nerves such as **cerebral palsy**, **Parkinson's disease** and **muscular dystrophy**, in which muscles become stiffer and weaker over time.

Flat feet are more likely to develop in patients with:

- **Obesity** - the additional weight will place added strain on the tendons which support the arches and they are more likely to collapse.
- **High blood pressure** - this may be an effect on the blood supply to the tendons in the foot.
- **Diabetes** - this affects the nerves in the feet and can also lead to weakness of the tendons.
- Pregnancy - a combination of added weight and the effects of pregnancy hormones which tend to soften supportive ligaments.
- **Rheumatoid arthritis** - this may weaken the tendons or affect the joints.
- A long history of running (straining the posterior tibial tendon).
- Greater age - the tendency of the tendons to tire and stretch increases with age.
- Research has suggested that some people have a particular tendency to tendon damage because of possession of a particular enzyme, a protein that can damage the tendon directly.

What are the symptoms of flat feet?

People who have had flat feet all their lives often typically have no symptoms at all. They are likely to have otherwise normal, flexible feet with no underlying tendon or joint problems, and their walking and running will have adapted to compensate. About 20% of UK adults have some degree of flat feet of this kind.

If flat feet do cause symptoms these may include:

- Foot pain:
 - This may be almost anywhere in the foot, depending on which part of the arch is dropping and which tendons are stretched or injured.
 - Pain may involve the whole foot or ankle, or just parts of it.
 - It is typically felt just inside the ankle, on the outer edge of the foot or in the arch itself.
 - The altered placement of the foot on the ground can then lead to pain in the calf, knee, thigh, hip or spine.
 - Over-pronation frequently leads to ankle pain and **Achilles tendinopathy**.
- Foot stiffness.
- Uneven wearing of shoes.
- The sensation of foot flatness or imbalance (particularly if only one foot is affected).

How are flat feet diagnosed?

- Your doctor can generally make this diagnosis just by observing your feet when you stand or walk.
- If the changes are recent the doctor will want to look for the underlying reason. This may involve testing your tendons and watching you walk; an X-ray or MRI scan of part or all of your foot may also be involved.
- You may suspect the diagnosis yourself by observing your wet footprint and noticing that the whole of the sole of your foot contacts the floor when you stand.
- If you push your big toe back as far as possible and the arch of your foot doesn't appear, your foot is likely to over-pronate when you walk or run.

What should I do if I have flat feet?

To the generation who watched "Dad's Army", flat feet were a reason to be refused entry into the Armed forces. In fact, flat feet which do not cause symptoms do not need medical care.

- You should see a doctor to discuss your flat feet if:

- The arches have dropped recently.
- You are experiencing pain in your lower limbs.
- Supportive, well-fitting shoes fail to help your aching feet.
- Your feet feel stiff or heavy.

What is the treatment for flat feet?

This depends on the symptoms:

- Foot pain may be alleviated by supportive, well-fitting footwear.
- Stretching exercises may be helpful prior to exercise. This may involve stretching the feet and stretching the calf and Achilles tendinopathy (toe curls and heel raises).
- Rest and ice can be useful, particularly after exercise.
- Physiotherapy can be useful to correct walking (gait) abnormalities which are developing because of the shape of the feet.
- Fitted insoles (arch supports designed for your foot) may relieve pressure on the arch. This may stop any tendency of the feet to roll inwards or outwards, which can increase lower limb and back pain.
- Wear shoes with low heels and wide toes.
- Walk barefoot when you can.
- Orthotic devices or ankle braces can be helpful if the posterior tibial ligament is inflamed. They may also be useful if the cause of the flat feet relates to problems with the nervous system or severe muscle weakness.
- Rest can be helpful, particularly if the problem has been made worse by overuse - for example, running on hard surfaces. Alternatively, consider switching to treadmill running for a time.
- Avoid high-impact sports which involve jumping and landing - for example, ballet and basketball.
- Weight loss is likely to be helpful if you are at all overweight.
- Rarely, abnormalities of bones in the foot may be surgically treatable. Treatments may include fusing bones, removing pieces of bony growth (spurs), tendon enhancement surgery and bone grafting. These treatments are only considered in cases where pain or foot damage is severe and it is clear that surgery can approach the root cause of the problem.

What are the complications of flat feet?

- The main complication is that, as flat feet become worse, the way you walk alters. A consequence of this, together with loss of the ability of the feet to contribute as well to balance and spring, can increasingly lead to pain further up the legs and in the back. This may include muscular pains, joint pains and inflammation of the tendons (for example, [Achilles tendinopathy](#) and [plantar fasciitis](#)).
- Altered walking and altered placement of the feet can also lead to further abnormalities of the feet such as [bunions](#), calluses, hammer toes and blisters.
- The loss of impact absorption by the feet in athletes can mean that impact is transferred further up the leg. As a result, overuse injuries such as [shin splints \(tibial stress fractures\)](#) are more likely.

Further reading & references

- [Pes planus/flat foot](#); Wheeless' Textbook of Orthopaedics, detailed information on paediatric and adult condition with resources and images

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