

FLAT FEET (Pes Planus)

Flat feet also known as pes planus, over-pronation or fallen arches is where there is little or no arch on the medial border of the foot when it rests flat on the ground ^{3, 9}. Flat feet usually involves both feet and it occurs both in adults and young children!



Common Signs of Flat Feet

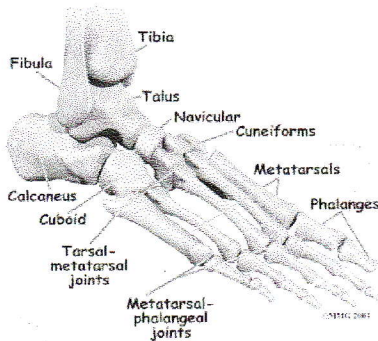
- ! Turning out of the heel bone away from the centre of the body
- ! Inward rotation of the leg
- ! Bulging of the inner aspect of the ankle
- ! Shifting of the forefoot outward from the heel

Adults with flat feet demonstrate several biomechanical inefficiencies in the foot and ankle, and a variety of gait abnormalities ^{1,2,9}. It is found mostly amongst the Asian community. The development of clinical problems is dependent on the levels of activity and the amount of repetitive stress the feet must endure ³.

Flat feet can be categorised into rigid and flexible. Flexible flat feet occurs in people who has a rather normal-appearing arch during non-weight-bearing ⁴. Rigid flat feet is the absence of an arch during non-weight-bearing ⁴.

Flat feet tends to be hereditary. When babies are borned, their feet look flat because an arch has not formed. Usually the arch should be formed by the time the child is 2 or 3 years old, and it may not develop fully until the child is 7-10 years old ⁵. Flat feet can be due to an inherited condition, constitutional hypermobility, neuropathic arthropathies or an acquired condition (e.g. arthritis, trauma, or musculoskeletal disorders), which developed over time ^{1,2,6}.

Anatomy of the foot



The foot is a complicated structure, made up of 26 bones held together by ligaments, muscles, tendons and connective tissue ⁴. This specialised alignment forms arches and sets up the foundation for the body's entire weight. There are three main arches in the foot-*medial longitudinal arch, lateral longitudinal arch and transverse arch* ⁴.

Mechanism of Flat feet

Flat feet are commonly accompanied by foot deviations ⁷. People with flat feet are unable to stride because at mid-stance, the medial border of the foot and big toe are slightly off the ground thus making them an ineffective lever to push-off ⁷. This will force the feet to roll excessively inward (over-pronation) before becoming an effective lever to push or toe-off ¹.

Flat feet alter the alignment of the foot, ankle, leg, pelvis, and lower back ¹. The absence or minimal appearance of the medial longitudinal arch results in the muscles of the leg over working to bring the arch up ⁸. This compensatory movement to the foot and toe often leads to plantar fasciitis, heel spurs, metatarsalgia, post-tib tendonitis, short or tight tendon archilles, bunions and hammer toes (refer to diagram below) ^{2,8}. Other associated problems may include shin splints, runner's knees, ankle, hip or back pain ³.

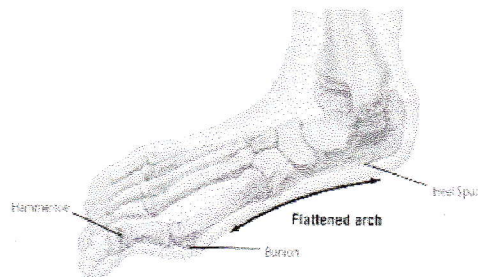


Diagram above & left: Other associated problems with flat feet- low back pain & callousity formed due to uneven distribution of pressure on the foot while walking ⁶

Assesment & Treatment

Diagnosis of flat feet includes examination of the feet and observation performed while the patient walks or runs³. Running shoes may also indicate abnormal patterns of wear. Once flat feet is detected, it is important to seek treatment as early as possible so as to minimise the risk of developping other associated medical problems. Children whose flat feet are treated early will have a better prognosis as their bones are still flexible.

How to determine whether one has mobile over-pronated feet?
Stand tip-toe or push the big toe up as far as it will go. If this causes the arch to appear, the foot is flexible and probably normal.

Evaluation for Orthotics

- "Tired Feet"
- Muscular tightness/ weakness
- Callous formation
- Areas of pain & tenderness

Conservative treatment of flat feet may include: anti-inflammatory medications, strengthening and stretching of the lower limb muscles, therapy, modification of shoes, and bracing⁸. Flexible flat feet that are painless do not require treatment. However, when pain does occur, wearing an orthotic can provide relief. These devices worn over a period of months will support the feet and create a better posture. In children, the orthotics will help in creating a better arch for the child's foot. Also, parents of young children are encouraged to do exercises for their feet to aid the development of the medial arch. These exercises include³:

- ✦ Toe clawing
- ✦ Foot closing – attempt to close the foot like a fist
- ✦ Standing on a book with metatarsophalangeal joints directly underneath and toes are flexed & extended
- ✦ Walking in a straight line

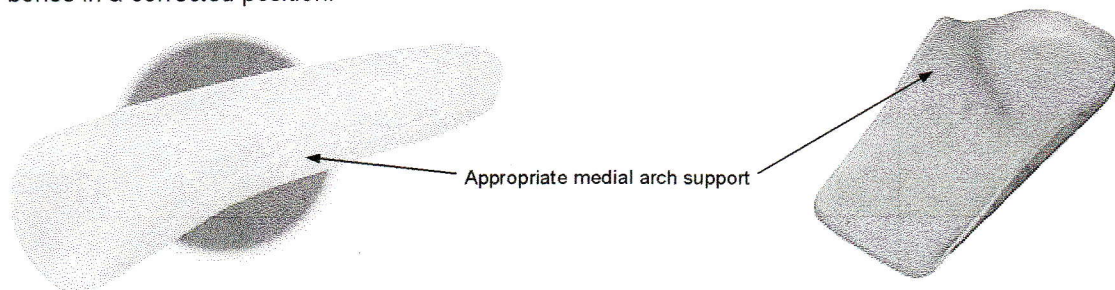


Orthotics are usually made from several types of material, ranging from spongy rubber, silicone to hard plastic³. These orthotics are either pre-fabricated or custom made. They should be designed with appropriate arch support and medial rearfoot posting to prevent over-pronation¹.

Why wear an orthotic?

- ⊙ Compensate any mechanical faults, allowing the feet to function with better efficiency.
- ⊙ Relief stress from compromised joints, ligaments & muscles.
- ⊙ Reduction of deforming forces acting on the foot

Rigid or painful flat feet require medical evaluation. The exact treatment depends on the cause of the flat feet. For severe cases, treatment starts with rest and possibly casting¹. If this fails to improve the pain, corrective surgery may be necessary to either resect the fused bone or completely fuse several bones in a corrected position.



Different designs of silicone insole to support the medial arch for adults & older children (L) & young toddlers (R)

Tips for buying shoes for persons with flat feet

- Ensure the footwear is fitted properly when trying shoes
- Choose a pair of shoes with a good heel counter to provide extra stability & comfort

Reference :

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