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## ***High Arches or Cavus Foot***

Muscles found in this area:

<b><i>Muscle</i></b>	<b><i>Origin</i></b>	<b><i>Insertion</i></b>	<b><i>Action</i></b>
Tibialis anterior	Tibia (lateral condyle + proximal shaft)	1 <sup>st</sup> metatarsal bone and medial cuneiform bone	Dorsi flexes and inverts foot
Gastrocnemius	Femoral Condyles	Calcaneus and calcaneal tendon	Plantar flexes, inverts and adducts foot, flexes knee
Plantaris	Lateral Supracondylar ridge	Posterior calcaneus	Plantar flexes foot, flexes knee also
Soleus	Fibula (head + proximal shaft) and Tibia (posteromedial shaft)	Calcaneus and calcaneal tendon	Plantar flexes, inverts and adducts foot
Extensor digitorum longus	Tibia (lateral condyle), Fibula (anterior surface)	Superior surface of phalanges 2-5	Extends toes 2-5
Extensor digitorum brevis	Calcaneus (superior and lateral surfaces)	Dorsal surface of toes 1-5	Extends proximal phalanges of toes 1-4
Extensor hallucis longus	Anterior surface of Fibula	Superior surface distal phalanx of great toe	Extends great toe

Reference for Diagram and Table:

Martini, F. (1998). Fundamentals of Anatomy and Physiology 4<sup>th</sup> Ed. Prentice Hall, USA.

***Why is it that when some people walk or stand for long periods of time they experience pain and tiredness in their feet and lower legs?***

I have always found standing and balancing asanas challenging, as they tire my feet, ankles and lower legs very quickly. I soon learned that it was because I had high arches. This made it difficult for me to even my weight across my feet, as only the balls of my feet, four of my toes and the heels actually contacted the floor properly. Over time I've noticed tightness through the Peroneus Longus, Peroneus Brevis, and the Soleus muscles.

Cavus foot (or "high arches") is a relatively common occurrence within the population (Martini, 1998). The resulting effect is often either collapsing inward through the arches or rolling outward so that much of the weight is focussed on the outer sides of the feet. Over time, as a person stands and walks around, a habit is developed based on this uneven distribution of weight. Consequently, some muscles are not used, whilst others are over used. Yoga practice can not only increase one's awareness of their own habit, but over time, different asanas can be used to lengthen and strengthen the affected muscles.

**Asanas to Warm and Stretch these Muscles:**

- Basic ***Pavanamuktasana series*** focussing on the feet:  
Alternate curling and stretching the toes,  
Alternate plantar (tip the sole of the foot downwards, increasing the angle between the foot and leg) and dorsiflex (tip the upper surface of the foot towards the top of the leg, now decreasing the angle between the foot and leg)  
Also, alternate eversion (turn the sole of the foot outwards) and inversion (turn the sole of the foot inwards)  
Rotate the feet in small circles a few times in each direction
- Standing in ***Tadasana (Samasthiti)***, focus on:  
Centring the weight evenly across the feet, and each toe, try to lift through the arches without lifting the balls of the feet if you notice your feet rolling inwards (also a helpful instruction for people with fallen arches).
- ***Adho Mukha Svanasana***, alternating bending one knee and lifting

one heel off the floor whilst pressing the other heel towards the floor, then repeat with the other foot. Repeat this for a number of breaths.

- ***Ardha Parsvottanasana***; focussing on keeping an even weight across the outstretched foot. This will help stretch and lengthen some of the tighter muscles along the side of the ankle (eg. peroneus brevis).

- ***Vajrasana, Supta Vajrasana, Virasana, and Adho Mukha Virasana***;

are all beneficial for flat feet. They stretch through the top of the foot, and encourage the arch to form under the foot. Supta Vajrasana (keeping ones knees off the floor) also stretches the muscles through the front of the lower leg.

#### **Asanas to Strengthen these Muscles:**

- ***Prasarita Padottanasana***

This stretches out and strengthens the muscles, in particular peroneus brevis (ideal for high arches).

- ***Malasana***

This also stretches out and strengthens the muscles, in particular peroneus brevis. It encourages strengthening of the muscles, as they are engaged to support your weight. As length and strength improves in this area, the student might like to try bringing their feet closer together until the toes and heels are touching.

- ***Paschimottanasana***

Like any of the Virasana poses strengthens the arch of the foot, ideal for those with flat feet. For those with high arches, if they can reach, holding onto the balls of the feet so they sit in line with the heels, also strengthens the aforementioned muscles.

#### **Asanas to Release these Muscles:**

After working with these muscles, particularly in those asanas that strengthen them, coming into Balasana or Vajrasana to rest and restore the body is ideal. Both these asanas will gently stretch out the feet, in particular the top of the feet and the arches. They also increase the blood flow to the muscle area when the legs are released.

**Asanas to be modified if these muscles are short or weak:**

For people with cavus foot, most standing poses, especially those requiring balance, can prove quite challenging. In particular:

***Malasana***

Focus on balancing on feet with heels descending to the floor, but keep arms outstretched in front for support, but also to counter the weight. Over time work up to upright balance, and then the full pose, but only when the strength and flexibility in the muscles (particularly peroneus brevis) is present. Also begin working this pose with feet apart, and slower bringing them closer together with time.

***Garudasana***

(focus on feet and arm work separately, then work up to doing it together).

***Vrksasana***

***Natarajasana***

***Ardha Chandrasana***

***Warrior III***

It would be more beneficial to hold each of these asanas for a short time, come out of them, and go back into them again, until the muscles are strengthened.

***Parsvottanasana***

***Virabhadrasana I***

***Trikonasana***

***Parivritta Trikonasana***

Supports would also be beneficial (i.e. Wall for balance support, wedges under heels and blocks under hands when cannot reach the ground comfortably). Perhaps in Parsvottanasana and Virabhadrasana I, the student might like to keep their back heel lifted if wedges are unavailable. Or the student could practise Ardha Parsvottanasana until their strength develops.

***Prasarita Padottanasana***

Can be adjusted so that those without strength might like to bend their knees a little, and gently try to straighten over time.

It is important to encourage the development of mindfulness in students around maintaining an even distribution of weight across the foot. If the arches are collapsing, continue to encourage them to lift through their arches (without lifting the balls of their feet) and even their weight across their feet. Similarly if the feet are rolling outwards, encourage students to ensure all 5 toes are connecting with the ground.