

Does Wearing Flip-Flops Affect Dorsiflexion? (Treatment Checklist for Plantar Fasciitis, Pt. 3)

Jeffrey Tucker, DC, DACRB

I have noticed over the 30 years I've been in practice that I tend to get more plantar fasciitis cases during the summer. I know there is a high rate of plantar fasciitis among runners and maybe runners' mileage is higher in the summer. Maybe more people wear flip-flops more often and longer in the summer. I wondered what research was out there regarding plantar fasciitis and wearing flip-flops; I discovered there is not much.

Shroyer and Weimar (2010) conducted a research project to determine if wearing flip-flops versus sneakers alters stride length, ankle angle, knee angle, impulse and two-dimensional ground reaction forces while walking. According to the researchers, flip-flops have been linked to IT band friction syndrome, plantar fasciitis and lower extremity pain. They state that there has been an increase in heel pain due to an increase in the use of flip-flops by teenagers and young adults, and they recommend that patients with heel pain avoid wearing flat shoes because there is little to no arch support.

According to the study, a decrease in [dorsiflexion](#) was seen while wearing flip-flops during the swing phase. The authors attributed the decrease in dorsiflexion to the contraction of the flexor digitorum longus and the flexor hallucis longus in an attempt by the wearer to prevent the flip-flop from coming off. As mentioned in my previous articles on plantar fasciitis, lack of ankle dorsiflexion has been associated with plantar fasciitis.



Interestingly, Shroyer and Weimar found that the plantarflexion angle during the swing phase increased while wearing flip-flops. Significant decreases in stride length while wearing flip-flops were also observed. The authors suggest this is due to the decrease in mass of the flip-flop versus the sneaker or any effort to prevent the flip-flop from coming off.

Wearing flip flops may change the wearer's walking gait for several reasons, such as not swinging the foot far enough forward and using the toes to grip the flip-flop through the gait cycle. I'm not sure of the authors' evidence to support these claims, but experience in their given fields could

constitute a certain amount of credibility toward the subject.

In terms of my own experience, I often see a relationship between asymptomatic, unresolved conditions (ankle sprains in this case) causing or contributing to something else mechanical (plantar fasciitis in this case.) Plantar fasciitis demonstrates the complex nature of foot pathology.

According to Denegar, et al. (2002), the hypotheses for limited dorsiflexion ROM post-lateral ankle sprain are tight ankle plantarflexor/scapsular and soft-tissue restriction; loss of normal posterior glide of the talus in the mortise; and loss of other accessory motions at the tibiofibular, subtalar and midtarsal joints.

What interventions can we pursue in the clinic for PF? Incorporate stretches as early as possible for the patient's home program. According to Mattes (2000), "Stretching helps establish full ROM of the ankle, the subtalar and metatarsal-phalangeal joints. It also assists in helping prevent problems such as calf injuries, shin splints, [Achilles tendon](#) injuries, foot stress, hammer toes and ankle-foot sprain or strains." The stretches include soleus, inner and outer gastroc, evertor and invertor, pronator and supinator, metatarsal arch flexors and extensors, as well as the great toe flexors / extensors.

Yamasaki, et al. (2010) conducted a study that observed the squat performance of 30 male subjects with multiple dorsiflexion angles. The ranges of dorsiflexion of the men who could and could not squat properly ranged from $18.9 \pm 4.6^\circ$ to $9.6 \pm 3.5^\circ$. The number of subjects who could squat decreased as the dorsiflexion angle decreased, and at less than 10° , none of the subjects could squat.

They also found that the center of foot pressure (COP) directly related to the amount of ankle dorsiflexion. As dorsiflexion decreased the COP moved anteriorly. This study is important because it shows how significant a small factor like ankle mobility plays in sports and training. If an athlete suffers from poor dorsiflexion, their squat technique may be hindered and it may place stress in joints that it shouldn't.

Even on-the-field performance can be affected by poor dorsiflexion. If an athlete with poor dorsiflexion goes to make a quick "cut" or move, it may place stress on the knee and hip joints or the wrong muscles, putting the athlete at higher risk for injury.

When I observe a patient with poor squatting related to dorsiflexion movement restriction, I center my core lifts around split squats and other movements that don't require much dorsiflexion. At the same time, I teach the patient simple stretching exercises and some drills with mini bands and stretch straps to try and increase dorsiflexion. The tibia, fibula and ankle mortise are key points to check for restriction that requires mobilization / manipulation.

Many people who use kettlebells believe the single-leg squat with a reach is the best exercise to increase running. It certainly can be used to increase dorsiflexion in anyone capable of performing this maneuver. One-legged squats are a difficult and challenging maneuver. I begin by demonstrating proper techniques: hands-held-overhead body-weight squats (on two legs), two-legged squats with hands on hips, and two-legged front squats holding a kettlebell.

I particularly look for movement faults that need to be corrected, like knee valgus and lumbar flexion, during these maneuvers. Typically I see lack of ankle dorsiflexion as the main culprit that effects the kinetic chain up above. I instruct patients to work with the foam roll at least five days per week, performing [self-myofascial release](#), stretching techniques, especially mobility of the soleus and gastroc to increase dorsiflexion. This one area of focus really helps patients with plantar

fasciitis. In-office sessions include reflex fascia therapy using the deep muscle stimulator (as taught by Dr. Jake Pivoroff) and instrument-assisted soft-tissue tools use as taught by Dr. Tom Hyde in FAKTR.

To help patients achieve optimal dorsiflexion, I check to see if they are able to put their right knee 3-4 inches in front of their right second toe while maintaining their COM through the ankle, not lifting their heels in the sagittal plane. This is an ankle mobility drill, and it is called the knee-to-wall tap. If the patient starts the drill and can only tap the knee to the wall from about an inch away, recognize that it could take months to get close to 4 inches from the wall. Be consistent and persistent!

References & Resources

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