Occupational Health Clinics for Ontario Workers Inc.

WORKING ON YOUR FEET




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Who Could Be Affected?

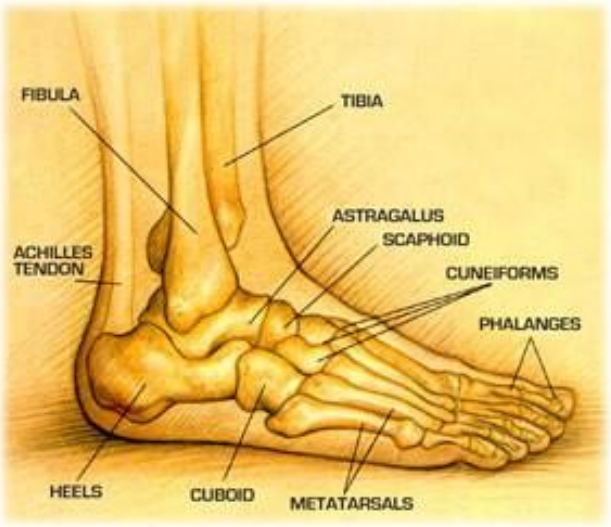
European studies report that between 1/3 – 1/2 of all workers spend more than 4 hours a day on their feet, standing and/or walking. The largest proportion of these workers work in the manufacturing and service industries, which include:

- Retail Salespeople
- Industrial Workers (e.g. Machine Operators, Assembly-Line Workers, Quality Control Inspectors)
- Supermarket Workers, especially Checkout Personnel
- Food Services Staff

Of course, many other kinds of workers also spend a large percentage of time on their feet, such as:

- Casino Dealers
- Mail Carriers
- Workers in Large-Scale Laundering Facilities
- Health Care Workers

How Are Feet Affected? The foot has dozens of bones, joints, muscles, nerves, blood vessels, tendons, and layers of fascia (connective tissue). When the body tissues are sufficiently stressed, they become swollen and/or inflamed. Chronic inflammation may create scar tissue and changes to bony structures. The "it is" behind the words such as "Achilles tendonitis" means "inflammation of the Achilles tendon".



The bones of the foot form arches that are supported by ligaments and muscles. These arches contribute to the strength, stability, mobility, and resilience of the foot. During standing, walking, running or jumping, the arches serve as shock absorbers, spreading energy before it is transferred higher up the leg.

If the arches are lost (for example through conditions of flat foot, overpronation, or simple overuse), the shock-absorbing quality of the arches disappears. This affects the feet, knees, hips and spine. Losing the arch in your feet also changes the position of the knee and hip, which makes them more vulnerable to injury from working on your feet.

Besides the stress of prolonged standing and walking on the foot, the architecture of the foot can also increase the symptoms from pre- existing conditions:

Plantar fasciitis refers to the inflammation of the fascia under the heel. Flat or tilted feet (from heel pronation) and bony spurs in the base of the ankle may make the condition worse.

Achilles tendonitis results from overstretching of the Achilles tendon.

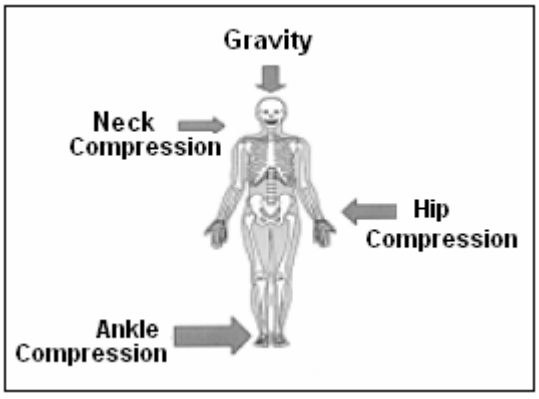
Bunions at the side of the big toe may arise because of heel pronation and may be aggravated by narrow shoe boxes (the area in front of the shoe) and prolonged standing/walking.

Corns on top of the toes may be aggravated by scraping against the inside of your shoe.

What Are Possible Health Symptoms From Working On Your Feet?

The most common symptom from working on your feet, and usually the first to occur, is discomfort and fatigue in the legs.

The closer the body part is to the ground, the more likely it will be affected by prolonged standing (i.e. the feet are most often affected, followed by the shins and calves, followed by the knees, thighs, hips and low back). However, symptoms from working on your feet may reach to the top of your body. In some studies, neck symptoms have been related to prolonged standing work!



Beyond simple fatigue and discomfort, more serious health effects can result from working on your feet. Some of these are:

- Low Back Pain (Drewczynski, Hansen, et al., Redfern & Chaffin)
- Painful feet and other foot problems (Drewczynski, Hansen, et al., Redfern & Chaffin)

- Plantar Fasciitis and Heel Spurs (Cailliet)
- Orthopedic changes in the feet (e.g. flat feet) (Redfern & Chaffin)
- Restricted blood flow (from standing only) (Hansen, et al.)
- Swelling in the feet and legs (Drewczynski, Hansen, et al.)
- Varicose veins (Drewczynski)
- Increased chance of arthritis in the knees and hips (Croft, et al.)

Initial symptoms can start within minutes into a standing task. Health effects have been shown to accumulate within days (no studies have assessed longer time periods).

> In lab experiments people could not distinguish fatigue in their legs from whole-body fatigue. Therefore, **that whole-body fatigue feeling could be related to working on your feet**

What Causes These Problems?

Joint compression

Gravity squeezes your joints under the weight of your body. Each body part is compressed by all of the sections of the body above it. (For example, your hips are compressed by your head, arms and torso, but your feet are compressed by the weight of your whole body!)

Compressing a joint is like squeezing a sponge – body fluids are squeezed out of the space in the joint. Without body fluids and circulation, your joints become malnourished, and cannot continue to support the weight of your body. Wear and tear of body parts occurs.

Postural muscle fatigue

Postural muscles keep your body from falling over while you are standing or walking. Standing or walking for a long time forces these muscles to work without a rest. Without rest, these muscles become exhausted, resulting in pain.

These effects are like working without lunch. Joints and muscles get their “lunch” from circulation, and need rest breaks to recoup from bouts of work. Think how you would feel without lunch!

Insufficient venous blood return in the legs

Gravity pulls blood down into your feet. One way that blood is pushed back up to your heart is through cyclic muscle contractions, often called a “muscle pump”. If the muscles are engaged in one long contraction to keep you standing, they cannot produce a “muscle pump” effect. Continuous muscle contractions also hinder circulation of body fluids.

Additional Causes Specific to Walking:

Shock transmission from heel impact on the floor
With regular walking, your heel lands on the floor with a force of 11/2-2 times your body weight. Such impacts can cause microscopic damage. Without enough rest (i.e. sitting or lying down), these microscopic traumas can build up into an injury.

What Can Be Done In The Workplace?

Three major things can be done in the workplace:

1. Reduce the time spent standing or walking.
2. Modify the floor surface.
3. Provide foot clearance at standing workstations.

Reduce the time spent standing or walking.
The duration of working on your feet is the most important factor. Therefore, there should be a time limit on standing or walking. Different researchers have suggested different maximum durations:

- Buckle, et al.: recommended working on your feet no more than 30% of every day
- Ryan: indicated that working on your feet for 45-50% of the day produces symptoms in the legs and feet, 25% of the day produces symptoms in the low back.

If people in your workplace are working on their feet for more than four hours per day you should try the following methods to reduce this:

- Alternate standing and walking with sitting. Sitting allows your upper body to be supported by the seat, instead of your legs and low back.
- Make work surfaces height-adjustable to allow both standing and sitting. If the height of the work surface cannot be changed, the person can be raised by positioning a temporary platform (e.g. large box, pallet) underneath the worker. Make sure these platforms can be removed for taller workers.
- Provide sit/stand stools for positions that traditionally require standing.

> Sit/stand stools are already used by grocery clerks and retail salespeople in Europe. These workers stand in North America only because ***custom*** says they should. Do these people ***really*** have to stand all the time?

What if sitting is not an option?

There is still a benefit from alternating between standing and walking. Walking has a muscle-pump effect to improve blood flow and partially counteract the effects of working on your feet. Shift your balance. This allows one leg to rest while the other supports your body. The other leg can rest when you shift back to the first leg. This also aids blood flow in the legs. If you have to stand in one place, put one foot up on a 6-inch stool. Some service counters have foot rails for this purpose. To avoid prolonged standing, organize your workspace to encourage periodic walking (e.g. position a storage cabinet on the other side of the room) – it is not always the best to have everything within arm's reach if you will be standing for 8 hours straight!

Modify the floor surface.

Floors in most buildings have a concrete base. Concrete is generally the worst surface to stand on. Therefore, any padding over the floor (e.g. carpet, mats, even cardboard!) will reduce the effects of working on your feet. However, some types of padding are better than others. Currently, the most effective kind of padding is "anti-fatigue" mats.

Things to Know about Anti-Fatigue Mats

Anti-fatigue mats come in many different sizes and forms, and are suited for different environments. There are even designs that are suited for the hygiene demands of kitchen floors! You should be aware of the specific needs of your work environment before looking for anti-fatigue mats.

Other important points:

- Most people think "the softer and thicker the mat – the better".

NOT TRUE!

- There is evidence that very soft and/or very thick mats actually increase a workers' leg and back fatigue. Thicker and softer is not always better.

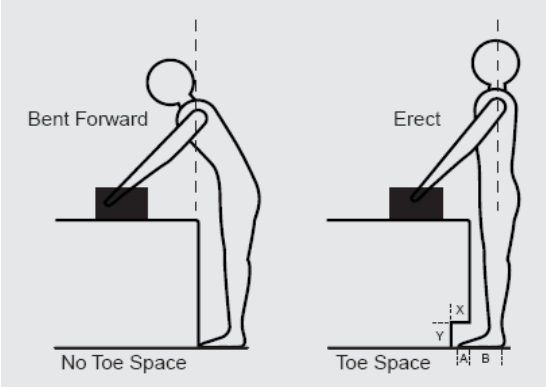
> The most important characteristic of an anti-fatigue mat is the overall preference expressed by the users.

- Anti-slip mats and other regular mats are NOT anti-fatigue mats!
- Anti-fatigue mats should still be designed so that they do not slide on the floor
  - Mats are available that are specially designed for slippery environments (e.g. kitchens, washing facilities)
- Anti-fatigue mats have a lifespan, currently ranging from 1-10 years. Anti- fatigue qualities cannot last forever! Because the rate of replacement of these mats will be a cost concern, be sure to check out the mats' life expectancy.
- Whatever mat you choose, be sure that the mats have sloped edges so that they do not become a trip hazard, and it is still easy to roll carts over them without running into a bump.
- Easy cleaning and sanitizing of the mat is important. Workers are less likely to use mats if they are difficult to clean.

Provide foot clearance at standing workstations.

Tables should have foot clearance space to improve standing work postures.

With no foot clearance space, the person must stand farther away and has a poor posture. De Laura and Konz (1990) recommend foot clearance space be 150mm (6 inches) deep, 150mm (6 inches) high, and 500mm (20 inches) wide. (Adapted from Rys & Konz, 1994)



What Can I Do For Myself?

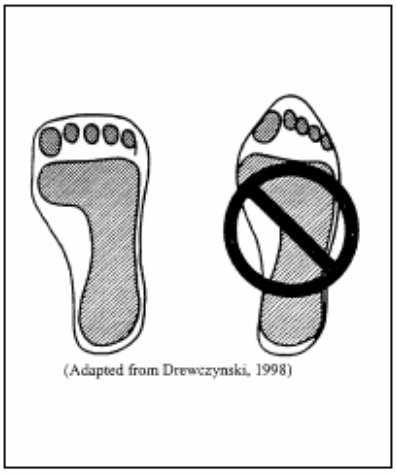
The following recommendations (for individuals) are not as effective or important as the recommendations (for workplaces) in the previous section. These recommendations are included primarily for workers in workplaces where improvements are not being made, and they have to look for other means to protect themselves.

1. Use insoles or orthotics.
2. Stand with one foot in front of the other.
3. Healthy weight reduction.
4. Address leg-length discrepancies.
5. Address personal health conditions.

Use insoles or orthotics

Using insoles or orthotics is like having a mat inside your shoes. The advantage is that you can take your mat with you anywhere you go!

- Be aware that insoles will change the fit of your shoe. Shoes that do not fit can cause other foot, leg or back problems. It may be necessary to buy both shoes and insoles together to ensure a proper fit.
- Orthotics may be necessary to treat a condition called overpronation. People with this condition are more likely to have foot problems.
- If you have questions or concerns about insoles or orthotics, ask your treating health professional.



(Adapted from Drewczynski, 1998)

Simply buying a NEW PAIR OF SHOES sometimes achieves the same effect. As shoes wear down, their shock absorbency decreases also. Very old shoes provide almost no protection against the effects of working on your feet.

Things to Know about Shoes

- Wear shoes that do not change the shape of your foot.
- Shoes should have a firm grip for the heel, but allow freedom to move the toes. Your feet should not slip inside your shoes, or the instability will lead to soreness and fatigue. Shoes with laces allow more control of how your shoe fits.
- Wear shoes with arch supports.
- Shoes with flat soles are not recommended. Your heel should be elevated by at least 1/4-inch.
- Shoes with heels higher than 2 inches are also not recommended.

The interaction of your shoes and the floor you work on is an important factor that is not entirely understood. There is some evidence that soft shoes and a hard floor may be the best combination to protect you while working on your feet! (Hansen, et al.) However, there is not enough study in this area to determine the best combination of shoes and mats that should be used in a workplace.

Stand with one foot in front of the other.

Preferably, the forward foot should be raised on a box or small stool.

- This posture helps shift your weight forward from the heel to the ball of your foot, which is healthier for weight-bearing.

Healthy weight reduction

- Gravity squeezes your joints under the weight of your body. The more you weigh, the more stress is placed on your legs and low back.
- If you are experiencing health problems from prolonged standing and/or walking, and weight is a concern for you, you might consider losing some weight to reduce the strain on your legs.

Address leg-length discrepancies

- A higher proportion of people with leg-length discrepancies (LLD) have back pain from working on their feet than people whose legs are the same length.
- However, many people with LLD have no pain, and many people without LLD have low back pain
- Therefore, there are other causes of low back pain that should also be considered

Because LLD has several different causes, you should discuss proper precautions and treatment with your doctor.

Address personal health conditions

Other personal health conditions can increase the risks of working on your feet. Orthopaedic conditions that affect weight bearing or conditions that affect circulation could be important. Keeping these conditions under control is important. You should discuss these with your doctor to decide what precautions to take. The following is a list of some conditions that could affect working on your feet:

- Diabetes
- Smoking
- Scoliosis
- Preexisting Plantar Fasciitis
- Cardiovascular
- Arthritis
- Gout

The Health of Your Fetus: A Special Consideration

Working on your feet can affect the health of your fetus. There are three common measures for fetal health: gestation age, birth weight, and spontaneous abortion.

Working on your feet for six or more hours per day has been related to pre-term births (before the normal 37-41 weeks) and low birth weight (less than 2500g or 5.5 lbs.)

Recommendations for Pregnant Workers

- Limit standing to less than two hours in a row. Even with this limit, floor matting should be provided.
- Prolonged sitting (more than two hours in a row) is also not good for the fetus, so pregnant workers should be able to switch frequently between sitting and standing.
- Workstation arrangement may have to be altered to accommodate the pregnant worker's new dimensions.
- Frequent breaks with the legs raised would be helpful.

Working on your feet also has potential health effects for pregnant workers. Interested people should refer to the Ergonomics & Pregnancy fact sheet also produced by OHCOW.

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