



## Ergo Tip of the Month - November 2008

### The Price you pay for High Heels and High Fashion The Negative Effects of High Heels on the Body

High-heeled shoes are a type of footwear, typically worn by women, where the heel of the foot is raised significantly higher than the ball of the foot and the toes. The idea that high heels can be hazardous to your health is not a new concept; orthopedists have warned women that high heels can contribute to the development of various conditions and pain in the lower extremities. The pain can range from mild to severe, including mild problems like corns and calluses, progressing to more severe problems like arthritis and back problems.

Many women are aware that high heels are not the most ideal shoes in the workplace, and they do not deny that they are painful to walk in. The fact remains that women continue to wear high heeled shoes although they do not think they are comfortable. When it comes to purchasing a shoe, fit governs comfort and comfortable shoes should closely match the shape of the foot. However, fit is not the key determinant when it comes to purchasing a shoe, visual appearance is.

A shoe is usually manufactured larger than the actual foot in order to prevent contact between the shoe and toes during walking, running and weight bearing tasks. However, problems arise if the shoe is too tight, big or loose. If the shoe is too tight, pressure will produce tissue compression making it uncomfortable; in comparison when the shoe is too loose, slippage between the foot and shoe can result in performance degradation and injury to soft tissue due to friction. Therefore, tight and loose fitting shoes may be undesirable because both can result in discomfort, pain or injury to the user (Au et al, 2007).

The negative side effects to wearing high heels:

- Increased spinal curvature resulting in lower back pain. When the weight of the upper body is increased, it creates additional compressive forces in the lower spine and places the user at risk for lumbar Lordosis (Lee et al, 2001). In addition, back muscle activity is increased to maintain and support the abnormal posture. A study done by Lee et al, (2001) found that wearing high heels decreased lumbar flexion as heel height increased. This in turn created a more unstable posture due to the increase

**Posture** ▶  
High heels push the center of mass in the body forward, taking the hips and spine out of alignment.

**Pressure**  
High heels may make legs look longer, but as the heel height goes up, so does the pressure on the forefoot.

**Pressure increases on forefoot when wearing:**

3-inch heels	+76%
2	+57%
1	+22%

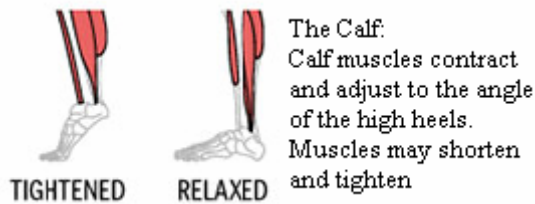


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in upper body mass.

- Leg pain can result due to added weight placed on the toes and balls of feet. Abnormal or heavy weight can progress into stress fractures which causes tiny cracks in the bone.
- Knees and feet are constantly being dynamically loaded, sometimes with loads that exceed the individual's body weight, due to various objects that are carried throughout the day (Dawson et al, 2003). This abnormal loading can increase the risk of developing osteoarthritis at the knee.
- Sprained ankle and rolled ankles are associated with wearing high heeled shoes. High heels cause a shift in weight to the ball of the foot, rather than distributing the weight over the entire foot. This in turn causes pressure, strain and pain on the forefoot (Au et al, 2007).



- Corns and calluses can develop due to friction between the shoe and the foot. Painful rubbing can occur from wearing high heeled shoes where the foot slides forward and creates uncomfortable pressure points.

- Hammertoe results when toes are forced against the front of the shoe and unnatural

bending of the toes occurs at the middle joint.

- Additional problems include increased oxygen consumption leading to an easier onset of fatigue. Also, altered gait patterns, changes in stride length and walking speed have been associated with wearing high heeled shoes.
- Shortened and tightened Achilles tendon can occur when wearing high heels daily because it prevents the tendon from fully stretching. The Achilles tendon connects the calf muscle to the heel bone and helps to point the foot downward, raise the toes and push off when walking (Au et al, 2007).

Changing your heel habits to minimize foot problems:

The list below provides some healthy shoe tips for purchasing shoes if you just cannot imagine life without high heels:

- Look for thicker soles for absorbing shock which puts less pressure on the foot, as well as an upper material (leather or microfiber) that will give a little to allow the foot to swell without pinching.
- Choose a squared-off toe versus a pointed toe and chunkier heels instead of stilettos. Stiletto, narrow type heels provide little support and pointed toe shoes pinch the toes and lead to additional foot problems such as bunions, calluses and hammertoe (Au et al, 2007). Select sensible heels with a low height, preferably a height less than an inch and a half.
- If high heels are a must, then limit the time you wear the heels. Alternating be-



tween high and low heeled shoes to prevent the Achilles tendon from tightening (Au et al, 2007). Wear flatter or tennis shoes for walking long distances, for example if you walk to work, change into the heels after arrival.

- Check your shoe size periodically because as you age, your feet get longer. You do not have to continuously measure your feet, but it is good practice to recheck your shoe size every few years. In addition, when getting your foot size, stand up because your feet expand when you step on them.



- There is no such thing as a 'break in' period; shoes should be comfortable when you purchase them. You should be able to wiggle your toes and the shoes should have a strong sole that flexes at the ball of the foot.

- Shop for shoes at the end of the day to accommodate the foot's normal swelling.

Many women feel that wide-heeled shoes are better than stiletto heels because it gives off a more stable perception when standing. The truth is, wide-heeled shoes may be better for your feet than stiletto heels, however they are just as bad for your knees. Many orthopedists have commented that high heeled shoes, whether thick or thin, can cause problems in women's ankles, feet and especially knees (Dawson et al, 2003).

Walking in high heels, no matter the height or width puts abnormal stress on both the front and the back of the knee (Dawson et al, 2003). Low-heeled or no-heeled shoes are the safest shoes for women to wear in the workplace, in order to prevent or lessen any lower extremity problems.

Remember to take care of the foot, and give it a nice massage or soak them in luke-warm water at the end of the day. Wearing high heels for work should be strongly discouraged, but women can still wear high heels, just save them for special occasions.

### **Resources:**

Au, E. Y. L and Goonetilleke, R. S. (2007) A qualitative study on the comfort and fit of ladies' dress shoes. *Applied Ergonomics* (38); 687-696

Dawson, J., Juszczak, E., Thorogood, M., Marks, S. A., Dodd, C., and Fitzpatrick, R. (2003) An investigation of risk factors for symptomatic osteoarthritis of the knee in women using a life course approach. *Journal of Epidemiology and Community Health* (58); 823-830

Lee, C-M., Jeong, E-H., and Freivalds, A. (2001). Biomechanical effects of wearing high-heeled shoes. *International Journal of Industrial Ergonomics* (28); 321-326

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