Are foot and ankle problems worse for women?

By Judith F. Baumhauer, MD, and Kathryn O'Connor, PT

For many years, research on foot and ankle pain and deformity has focused on shoes. In fact, shoe style is the most studied extrinsic factor for foot and ankle injuries in women. Athletic shoes for women, for instance, have traditionally been designed as scaled-down versions of men’s shoes. Research shows, however, that women’s feet are not just smaller versions of men’s feet.

Understudied differences in foot structure, muscle strength, ligament laxity, and proprioception are all intrinsic factors that can initiate a predisposition for pain and injury in females. Little attention, however, has been given to intrinsic physical differences in male and female foot structure.

A research study by Wunderlich and Cavanagh examining lower limb and foot measurements of approximately 300 men and 500 women in the U.S. Army concluded that biologic differences existed between male and female feet and legs. They noted significant differences in arch shape, size of the lateral side of the foot, great toe, and ball of the foot. Women, for example, had a wider forefoot, shorter arch length, and shorter metatarsals compared to men. This study was among the first to promote incorporating the structural differences between the female and male foot into the design and manufacturing of women’s shoes.

Differences extend beyond the foot

According to a report by Fessler and associates, males have higher foot length-to-body height ratios than females. Therefore, the differences in foot length between men and women is generally proportional to stature. Studies have shown that differences in the structure and size of the foot bones (specifically by measurements of metatarsal, phalangeal, calcaneal, and talar bones) have allowed for forensic identification of sex.

In addition to differences in skeletal structure, studies by Eckstein and associates used magnetic resonance imaging to observe differences in cartilage between men and women, including volume, surface area of the joint, and cartilage thickness. Although the initial purpose of the study was not to identify sex differences, statistically significant disparities were noted. For instance, the study showed that women had a 20 percent to 25 percent lower volume and surface area in the subtalar, talonavicular, and ankle joints and up to 16 percent thinner cartilage.
Women and men also have significant differences in gait. Studies by both Kerrigan and associates and Sepic and associates have shown that plantar flexion and range of motion of the ankle are greater in women, possibly due to greater laxity in female ligaments. Numerous studies have observed greater ankle and knee laxity values in women.

Glass slippers are for fairy tales

An appropriate fitting, comfortable shoe rarely equates to stylish, fashionable footwear in a woman’s world. Unfortunately, the typical, more fashionable high-heeled shoe with a narrow toe box causes increased plantar pressure and toe crowding, which can cause bunions (hallux valgus), bunionettes, hammer toe, and even neuromas in severe cases.

Studies show that 88 percent of women wear shoes too small for their feet and 70 percent were noted to have associated hallux valgus deformity. National studies show approximately 1 percent of all adults have hallux valgus, with an increasing prevalence with age; although only 9 percent of 30-to-60-year-olds have bunions, approximately 16 percent of people older than age 60 have them. Women are two to four times more likely to have hallux valgus than men, likely due to a combination of intrinsic structural features and extrinsic footwear options.

Additionally, the incidence of hammer toe is four to five times more common in women. In 1991, approximately 209,000 bunionectomies, 210 hammer toe corrections, 66,500 neuroma resections, and 119,000 bunionette repairs were performed.

Poorly fitting shoes affect more than just feet. Shoes with a heel of 1.5 or higher increase knee torque with walking, with the increase of knee osteoarthritis among women who prefer higher-heeled shoes. Additionally, pain caused by an the risk of falling and otherwise hamper mobility, which may lead to injury. This is particularly significant in the elderly

Numerous studies have examined footwear in elderly patients at the time of a fall and have shown that a high percentage of those who fell were wearing slippers. The excessive flexibility of slippers and their lack of stability are associated with a higher incidence of tripping and falls.

Next steps?

We have a long way to go in examining intrinsic differences between the female and male foot. Limited research has been published on sexual dimorphism of the foot and ankle; many of the studies only retrospectively observed anatomic differences to explain injuries unique to women. Several investigators have suggested that proprioceptive differences are to some extent responsible for ankle ligament injuries.

As knowledge of sexual dimorphism and the unique healthcare needs of women advance, interventions that are related to intrinsic differences, as well as the extrinsic factors of the foot and ankle, will be imperative to provide appropriate preventive and therapeutic care for women.

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Putting a little sex in your orthopaedic practice

This quarterly column from the AAOS Women’s Health Issues Advisory Board and the Ruth Jackson Orthopaedic Society provides important information for your practice about issues related to sex (determined by our chromosomes) and gender (how we present ourselves as male or female, which can be influenced by environment, families and peers, social institutions, etc.). It is our mission to promote the philosophy that male and female patients experience and react to musculoskeletal conditions differently; surgeons should not have a one-size-fits-all mentality when it comes to patient care.