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FOOT & ANKLE

American Orthopaedic Foot and Ankle Society Women's Shoe Survey

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ABSTRACT

Shoes have been implicated as being responsible for the majority of foot deformities and problems that physicians encounter in women. A total of 356 women were studied in this investigation to evaluate trends in women's shoe wear and their effect on the development of foot deformities and pain. The majority of women in this study wore shoes that were too small for their feet, had foot pain and deformity, and had increased shoe size since the age of 20. Few women had their feet measured in over 5 years. The women without foot pain or deformities also wore shoes that were smaller than their feet but to a lesser degree.

For thousands of years, humans have worn shoes. It has always been recognized that shoes provide protective covering for the feet, but in more recent times, shoes have also been implicated as the principal cause of the majority of forefoot deformities encountered in women. The harmful effects of footwear have been noted by several authors.[1-12] The deforming effects of ill-fitting shoes on a normal foot can cause hammertoes, hallux valgus, bunionettes, corns, and other disabling problems (Fig. 1). The purpose of this study was to evaluate trends in women's shoe wear and their effect on the development of foot deformities and pain.

MATERIALS AND METHODS

A total of 356 women were evaluated in this study. The study was restricted to women aged 20 to 60 years with no history of diabetes, rheumatoid arthritis, previous foot trauma, or foot surgery. Seventy-three percent of the women were patients in an orthopaedic office who were seen for all types of orthopaedic complaints, including foot problems. Twenty-seven percent of the women were not patients. Information was collected on occupation, foot size, shoe preference, shoe comfort, shoe size, presence of foot pain, and deformity. All women were evaluated by an orthopaedic surgeon who noted any foot deformities and obtained shoe and weightbearing foot tracings (Fig. 2). The foot tracing was measured by drawing a line bisecting the center of the heel with the center of the second toe. The widest line that could be drawn that was perpendicular to this line was measured and recorded as the width of the foot. The shoe tracing was measured by drawing a line bisecting the center of the heel with the center of the most distal aspect of the toe box. The widest line that could be drawn that was perpendicular to this line was measured and recorded as the width of the shoe. Any discrepancy between the shoe and the foot was noted.

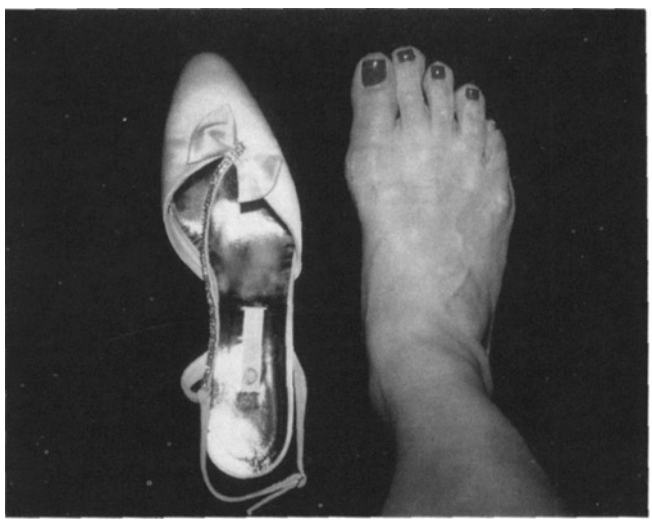

Fig. 1. Ill-fitting shoes have been implicated as the principal cause of the majority of forefoot problems seen in women. The majority of women in this study wore shoes that were smaller than their feet.

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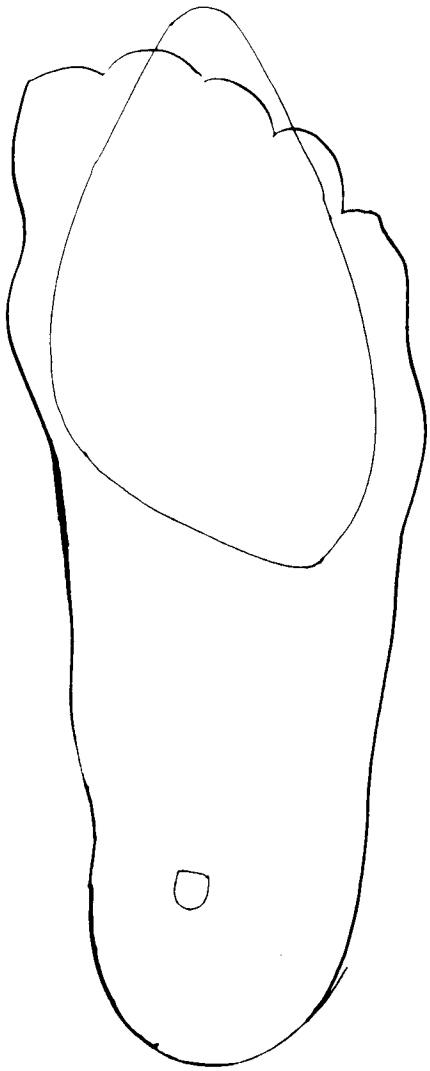

Fig. 2. Tracings and measurements were made of the weight-bearing foot and the shoe. These values were compared.

RESULTS

The average age of the subjects was 42 years (range 20–60 years) Twenty-three percent were 20 to 29 years old, 27% were 30 to 39 years old, 24% were 40 to 49 years old, and 26% were 50 to 60 years old. The occupations of the participants included 23% professionals, 19% nurses and other health care workers, 19% clerical and sales, 19% homemakers, 5% teachers, 5% students, and 4% entertainers, artists and sports professionals.

Sixty percent of the women believed that their shoe size had increased since they were 20 years old, but 75% had not had their foot measured in more than 5 years. If the increase in shoe size is evaluated by age group, 18% of the 20- to 29-year-old women, 43% of the 30- to 39-year-old women, 69% of the 40- to 49-year-old women, and 95% of the 50- to 60-year-old women had an increase in shoe size since the age of 20 years. Sixty-six percent believed that one foot was larger than the other (36% right and 30% left).

Seventy-two percent of the women considered themselves a B width, with the average width in this group at 9.11 cm (range 8.0–11.0 cm). Eighteen percent of the women considered themselves a C width, with the average width in this group at 9.56 cm (range 8.0–11.5 cm), and 10% considered themselves an A width or less, with an average width in this group of 8.89 cm (range 7.8–10.0 cm). The average width for all the women studied was 9.21 cm (range 7.8–11.5 cm).

Seventy-two percent of women stated that their work shoes were comfortable (19% wore sneakers, 27% wore high heels, and 54% wore flats). Twenty-eight percent stated that their work shoes were not comfortable (4% wore sneakers, 62% wore heels, and 34% wore flats). Overall, 14% of the women wore sneakers to work, 37% wore heels, and 49% wore flats. Eighty-seven percent stated that the shoes they wore for leisure were comfortable (39% wore sneakers, 10% wore heels, and 51% wore flats). Six percent of the women in this study stated that they never wore anything but sneakers.

Eighty percent of the women stated that they had some foot pain. The pain was located in the toes (including bunions, hammertoes, and bunionettes) in 58%, in the ball of the foot in 27%, in the arch in 10%, and in the heel in 5%. Seventy-six percent had one or more forefoot deformities noted, with hallux valgus being the most common (71% of this group had hallux valgus, 50% had hammertoes, 18% had bunionettes, 13% had prominent metatarsal heads, and 4% had miscellaneous deformities). The incidence of hallux valgus overall was 54%.

Eighty-eight percent were wearing shoes that were smaller than their feet (average 1.2 cm smaller). In those women who had no foot pain, the average foot-shoe discrepancy was only 0.56 cm (20% of women in the study). In those women without any deformity, the average discrepancy was 0.60 cm (23% of the women in the study) (Table 1).

DISCUSSION

Shoes have been implicated as being responsible for the majority of foot deformities and problems that physicians encounter in women, with the greatest single factor in creating them being a shoe that is improperly manufactured or fitted. The deforming effects of improper shoes on a normal foot can cause hallux valgus, bunionettes, hammertoes, callouses, corns, metatarsalgia, and other problems. Eighty percent of the women in this study had some foot pain and 76% had one or more forefoot deformities. Hallux valgus was

TABLE 1
Results of AOFAS Women's Shoe Survey

Age groups	
20–29 years	23%
30–39 years	27%
40–49 years	24%
50–60 years	26%
Biggest foot	
Right	36%
Left	30%
Equal	34%
Change in shoe size since age 20	
Shoe size increased	60%
Shoe size not changed	40%
Data by age group	
20–29 years	18% increased in size
30–39 years	43% increased in size
40–49 years	69% increased in size
50–60 years	95% increased in size
Last time foot measured	
<5 years	25%
5–10 years	39%
10–20 years	36%
Type of work shoe used	
Sneakers	14%
Heels	37%
Flats	49%
Type of leisure shoe used	
Sneakers	39%
Heels	10%
Flats	51%
Are your work shoes comfortable?	
Yes	72%
Sneakers	19%
Heels	27%
Flats	54%
No	28%
Sneakers	4%
Heels	62%
Flats	34%
Are your leisure shoes comfortable?	
Yes	87%
No	13%
Foot pain	
Yes	80%
No	20%
Where is pain?	
Heel	5%
Arch	10%
Ball	27%
Toes	58%
Foot deformity	
Yes	76%
No	24%
Type of foot deformity	
Hallux valgus	71%
Hammertoes	50%
Bunionette	18%
Prominent metatarsal	13%
Miscellaneous	4%
Foot-shoe size discrepancy	
Foot bigger than shoe	88%
Foot same size as shoe	6%
Foot smaller than shoe	6%
Average discrepancy if foot bigger than shoe	1.2 cm (range 0.1–2.7 cm)
Those with foot smaller than or equal to shoe had	
Pain	64%
Deformity	57%
Those with foot larger than shoe had	
Pain	84%
Deformity	79%

the most common deformity noted and occurred in 54% of all women in the study. Eighty-eight percent of women were wearing shoes that were 1.2 cm smaller than their feet on average. In those women without any foot deformities (23% of the women in the study), the average discrepancy was only 0.60 cm.

The authors recognize that although the shoe appears to be the essential extrinsic factor contributing to the development of forefoot deformities in women, the fact remains that there are many individuals who wear high fashion footwear who do not develop foot pain (as seen in 20% of the women in this study) or deformities (as seen in 23% of the women in the study). There must be some intrinsic factors that make some women more vulnerable to the deforming effects of shoes and cause a small percentage of unshod feet to develop hallux valgus and other forefoot deformities.

It is apparent that women need to be instructed in proper shoe fit. The shoe fitter in the shoe store takes two basic measurements, foot length and ball width. But, feet of identical linear measurements can often differ in volume size or measurement, and hence in the fit of the shoe. This is why a shoe of a given size and width in one last (the foot-like form over which a shoe is made) will fit and another last will not. The difference is volume distribution. To ensure adequate length and width, shoes should always be fit to the weightbearing foot. Women should fit shoes at the end of the day when their feet are at their largest. The shoe upper should not wrinkle with flexion of the foot, and the foot should not bulge over the welt (the strip of leather or other material that joins the insole with the outer sole). The end of the longest toe of the biggest foot (66% of the women in this study had one foot larger than the other) should be within ½ inch (a fingers breadth) from the end of the toe box. The forefoot should not be crowded and the toes should be allowed to extend. There should be a relatively snug grip of the counter about the heel.

The majority of women in this study stated that they

wore flats for work and play, but even the selection of a low heel shoe does not ensure good shoe fit and comfort. It is recommended that women not only select a shoe of lower heel height, but also a shoe with a more rounded toe box that fits the width of the foot. Soft materials such as suede and glove leather are recommended.

The majority of women in this study wore shoes that were too small for their feet, had foot pain and deformity, had increased shoe size since the age of 20, and had not had their feet measured in over 5 years. The women without foot pain or deformity also wore shoes that were smaller than their feet but to a lesser degree.

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