

A Study Examining the Occurrence of Corns and Calluses in Males and Females

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Abstract

This study was conducted to determine if female developed corns and calluses more than males. A survey was administered to a total of 100 participants, fifty females and fifty males. Corn and callus development was determined by which group had a greater number of corn and callus present on both feet. A statistical analysis was performed using the number of corns and calluses each participant had using Minitab 14 (Minitab®, 2005). The paired T-test was used instead of the regular T-test because there were two conflicting hypothesis (Minitab®, 2005).

Introduction

Many individuals take foot health and the use of their feet for granted. What many of us fail to realize is that our feet play a critical part in helping us get from one place to another. Our feet are also responsible for us being able to stand upright, walk, or jog, and to bear the weight of our bodies. Two of the most common foot ailments seen by podiatrists across the United States are corns and calluses (Dunn *et. al.*, 2004). Many people in our society view these foot problems as if they were invisible, often carrying on with their daily activities without noticing them. Calluses and corns can appear on any part of the feet and, when left untreated, can cause problems ranging from small calluses to serious infectious ulcers developing under a corn. Hyperkeratosis, heloma, tyloma, and clavus are some medical terms that podiatrists use for corns and calluses (Freeman, 2002). Hyperkeratosis is an appearance of thickened, horny, verruca-like scales (for example, warts and calluses) in specific areas and/or all over the entire body. Heloma is the scientific name for a corn, and tyloma is another name for a callus.

A corn or callus is the thickening of the skin in response to some sort of pressure

of friction. Corns and calluses develop from the same cause and the only difference between the two is their physical characteristics and locations. Calluses are a diffused thickening of the skin on the balls of the feet and sometimes can be found on the sides of toes as well. A central area where the skin has greatly thickened and become hard is a corn. Corns are most commonly found on the tops or the sides of toes. In some rare instances, a corn can develop under a callus and the callus can also surround it. The formation of calluses and corns can occur on the balls of the feet, top and tips of the toes, under the big toes, behind and on the bottom of the heels, and finally in between the toes (Singh *et. al.*, 1996). Another difference between corns and calluses is that corns are cone-shaped with their points protruding into the dermis, or inner layer of skin. They usually have hard, shiny surfaces surrounded by red, painful areas (Fig. 1). Calluses typically involve only the outermost layers of skin and are not usually painful. They tend to disappear once the source of irritation has been removed (Fig. 2).

Corns and calluses can generally be categorized by being soft and/or hard. Hard

corns are usually located on the little toes or the top portions of the other toes. Soft corns are usually found in between the toes and they are softer than hard corns because of



Figure 1. Corns
(Freeman, 2002).



Figure 2. Callus
(Freeman, 2002).



Figure 3. Soft Corn
(Singh *et. al.*, 1996)

their location (Fig. 3). The moisture in between the toes is from sweat and inadequate drying and is what keeps these types of corns soft.

Many misunderstand corns and calluses, but the body develops them for protection and some degree of callus formation on the sole of the foot is normal (Singer & Briskin, 2002). Calluses and corns can also be a warning signal which notifies individuals that they may be starting to develop a more serious foot ailment like diabetes, poor circulation, or peripheral neuropathy. The skin thickens when a corn and callus is about to form to protect the feet from pressure and friction. Calluses and corns become irritated whenever pressure and friction increase and the skin gets thicker. The outcome of this is painful and can be self treated, or one may have to seek a podiatrist if the problem persists. If one does not seek proper treatment, the corn or callus may turn into an ulcer (abscess) and spread to other parts of ones' foot. Corns

are more likely to get to this rare stage than calluses (Munro & Steele, 1998).

Ill-fitting footwear, anatomy of the feet, improper footwear, and deformities of the feet such as hammertoe all contribute to corn and callus development (Grouios, 2004). Ill-fitting footwear and improper footwear may sound the same, but they are different. Improper footwear is the wearing of a certain type of shoe for the wrong occasion, for example wearing basketball shoes to run track in and ill-fitting footwear is simply wearing shoes that do not fit. Many individuals who inherit hammer toe and bunions from their parents have a greater chance of developing calluses because of the increased pressure they have on their bony prominences and on the tops of their toes. Basic biomechanical abnormalities such as being flat-footed, pronation, supination, and the way a person walks can cause pressure under the feet, increasing one's chance to develop calluses (Singer & Briskin, 2002). The type of skin that people have can also contribute to the development of calluses. People who lose elasticity and fatty tissue over the years, mostly the elderly, have an increased chance of developing calluses on the bottoms of their feet because they have less fatty padding to cushion their feet (Grouios, 2005). Other groups that are affected or have a higher chance of getting calluses and corns are those who have certain jobs that require a lot of standing or walking around, such as waitresses, nurses, and mail carriers (Singh *et. al.*, 1996).

Women between the ages of 20-50 have a greater chance of developing corns and calluses than men because of three main factors: differences in the anatomy of the foot, ill-fitting shoe wear, and improper foot wear (Frey, 2000). Females and males have different biomechanics and structures of the feet. Females usually have a narrower heel in relationship to the fore foot and, overall,

their feet are narrower than men's feet relative to their length (Frey, 2000). Two factors that affect how a woman's shoe fits are having a smaller Achilles tendon and pronating more than men. Many studies have shown that women pronate more than men because of the size difference in the Achilles tendon. Recent studies have concluded that shoes are the principal cause of forefoot disorders in females (Frey, 2000). In a recent study done of 784 older adults, and 60% had corns and calluses, 74% had lesser feet deformities (flat feet), and 37% had bunions (Dunn *et. al.*, 2004). Dunn and colleagues (2004) concluded that toenail conditions, fungal symptoms, and ulcers or lacerations were more common in men; and that corn, calluses, and bunions were more common in women. They also found that the reason for the women developing these sorts of ailments was primarily due to improper and ill-fitting shoes.

Many studies link corn and callus development in women to shoe selection. The majority of studies found that women, more than men, were on the feet more in types of shoes that were not suitable for long time wear. Some of the types of shoes were high heels, pointed-toe heels, and high-arched boots. The studies also concluded that women, more than men, wore shoes for their looks and not necessarily for their comfort (Freeman, 2002). Freeman (2002) found that women and men have different shaped feet and that this contributes to differences in the frequencies of corn and calluses between genders.

I studied 50 men and 50 women between the ages of 20-50 to determine the relative frequency of corn and callus formation. I discovered which sex is affected more due to the amount of corns and calluses present on the feet, the differences in foot anatomy, and ill-fitting shoe wear. I hypothesized that the females in the study would have a higher occurrence of

corn and callus development than the males, because of the three reasons that I stated above.

Methods

During the first week of February, I canvassed the Saint Martin's University main campus, went to residence halls, and asked students if they would be interested in participating in my senior seminar research project. I got fifty female participants and fifty male participants between the ages of twenty and sixty four. I made sure to try and get an extra ten participants for each group, in case some participants decided to drop out of my experiment or could not make the interview. Some of the contact information I collected from potential subjects was their first and last name, age and gender. I used four questions in the interview session with each individual. The four questions are listed in Table 1.

Table 1. The four interview questions asked of subjects.

1. Have you ever worn orthotics or insoles?
2. Do you know if you are flat-footed or high arched? If so which one?
3. Do you have corns and/or calluses? Are your corns and calluses ever painful?
4. How or where do you think you got your corns and calluses?

During interviews with my participants, I took pictures of their feet, especially the parts of their feet where corns and calluses usually developed, and I asked them questions. When I did this, I reminded the participant that the pictures of their feet would be shown to students, staff, and faculty at SMU who attended presentation, but that no one would know whose feet they were. I had also had each individual sign a consent form, which let them know that the information they had given me was confidential and no one else would know

about it. I compiled my data into tables and charts. I divided the information that I gathered on each individual by their gender, the types of shoes they wore on a regular basis, they type of job they have, how long they are on their feet during the course of a day, lengths and widths of their feet, any foot deformities they had, and how many corns and calluses they had on each foot. A statistical analysis was performed using the number of corns and calluses each participant had using Minitab 14 (Minitab®, 2005). The paired T-test was used instead of the regular T-test because there were two conflicting hypothesis (Minitab®, 2005).

Results

I did a survey of one hundred people, fifty males and fifty females who ranged from eighteen to sixty years old. The survey

was taken to test the hypothesis that females develop corns and calluses more than males. The raw data can be found in appendix. The paired t-test accepted the null hypothesis that females develop more corns and calluses. The alternative hypothesis that was rejected was that the males would have a higher development of corns and calluses, which was not the case in this study.

The corn and callus development scores were analyzed using α -level of 0.05, and was a 95% confidence interval within the study. The confidence interval implied 95% confidence that meant the difference was greater than or equal to 0.027 and less than or equal to 0.011 (Minitab®2205).

The standard deviation of the sample difference was the same in the men's corn and callus development, but different in the females as shown in Table 2. This data is shown graphically in Figure 4.

Table 2. Average number of corns and calluses found in male and female subjects. Standard deviations and sample sizes (n) are also given.

	N	Mean	St Dev
Men Callus	50	0.360	0.802
Men Corns	50	0.360	0.802
Women Callus	50	1.800	2.000
Women Corn	50	0.260	0.633

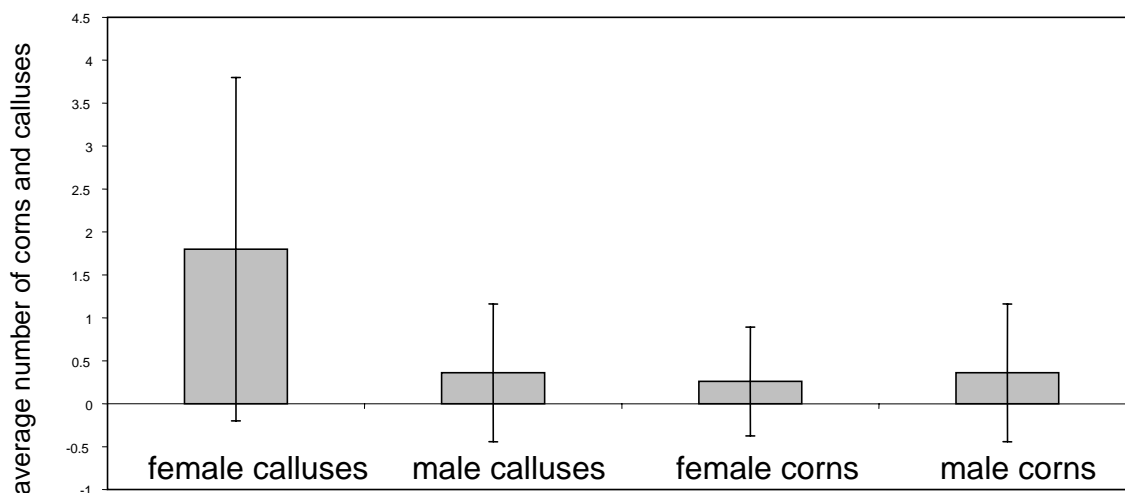


Figure 4. A comparison of the average number of corns and calluses in men and women. Error bars represent one standard deviation about the mean. A total of 50 men and 50 women were surveyed.

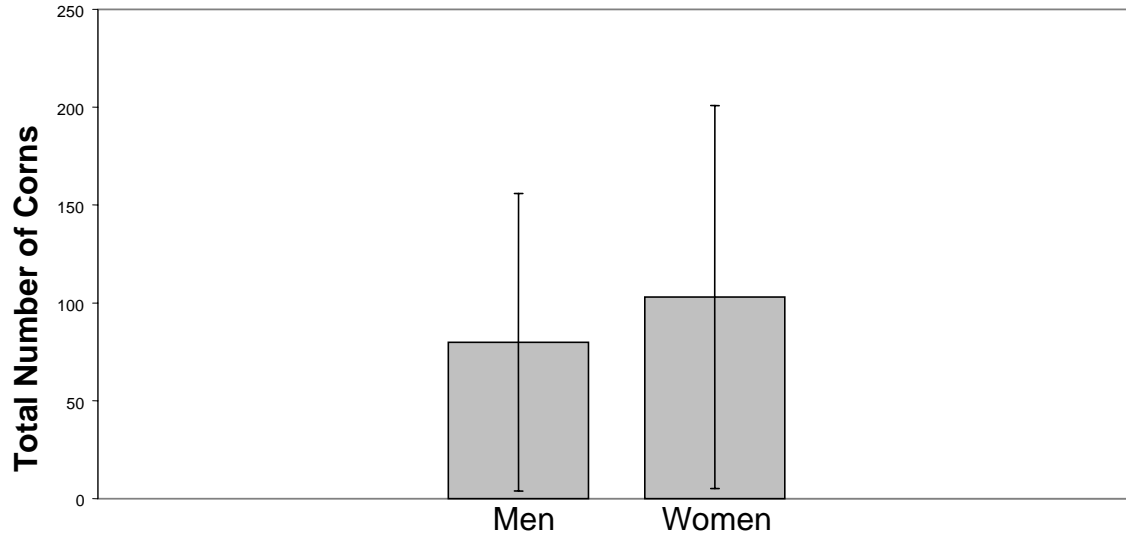


Figure 5. Each bar represents the total number of corns & calluses. The error bars are one standard deviation above the mean. In this chart the women had a total number of 103 corns and calluses and the men had 80.

Figures 6 and 7 show a comparison between the male and female participants and who had the most corns and calluses.

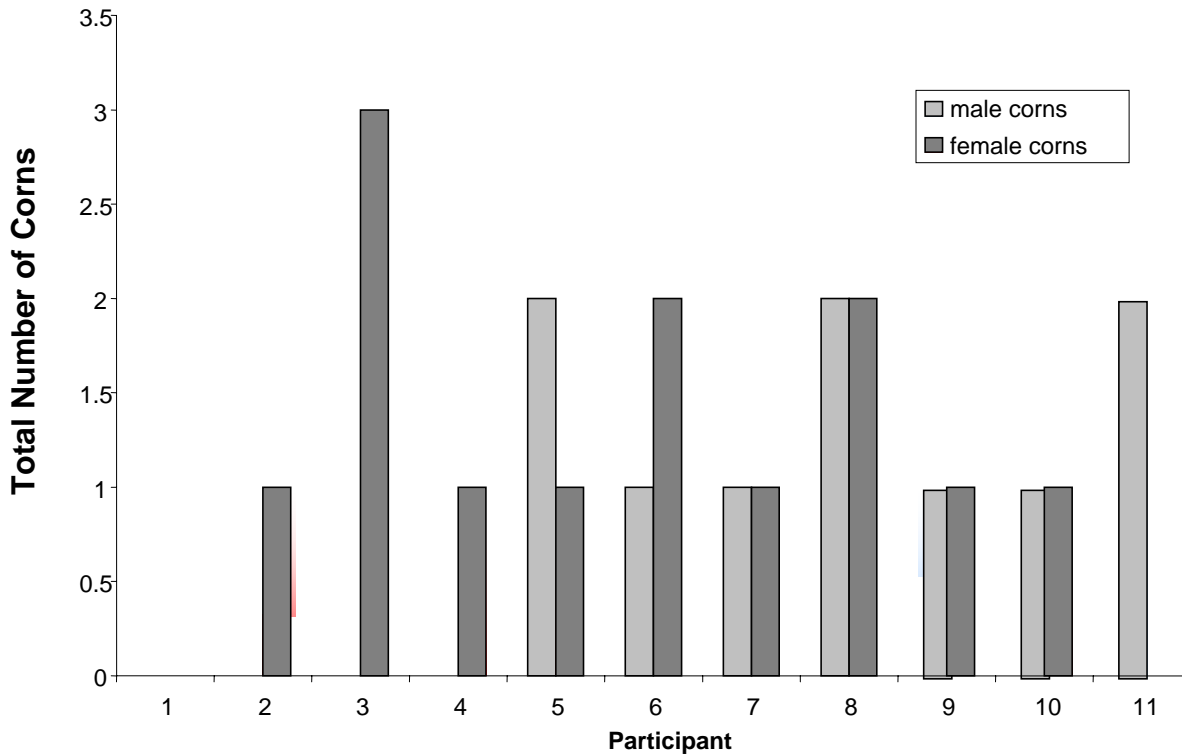


Figure 6. Each bar represents the number of individual participants that had corns. Only 11 out of the 50 men that I surveyed that had corns present of their feet and the total number they had was 16. There were 10 women out of the 50 that I surveyed that had corns present on their feet and the total number they had was 12.

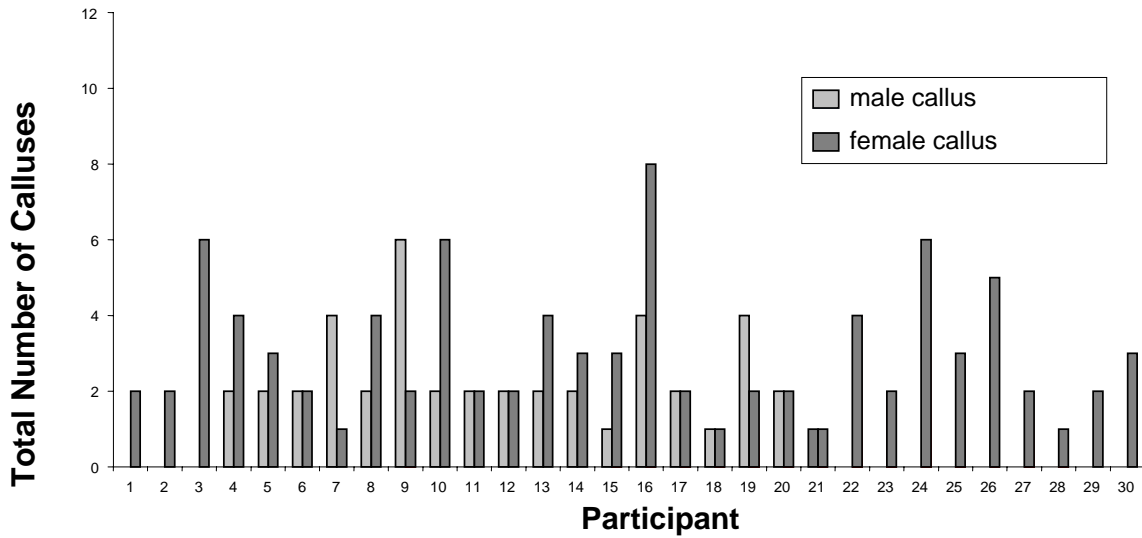


Figure 7. Each bar represents the number of individual participants that had calluses. Only 21 out of the 50 men that I surveyed had calluses with a total number of 61 on their feet. There were 30 out of the 50 women that had a total of 90 calluses present on their feet.

Lastly, Figure 8 shows a comparison of both groups given and measured shoe size and the discrepancies that each group had.

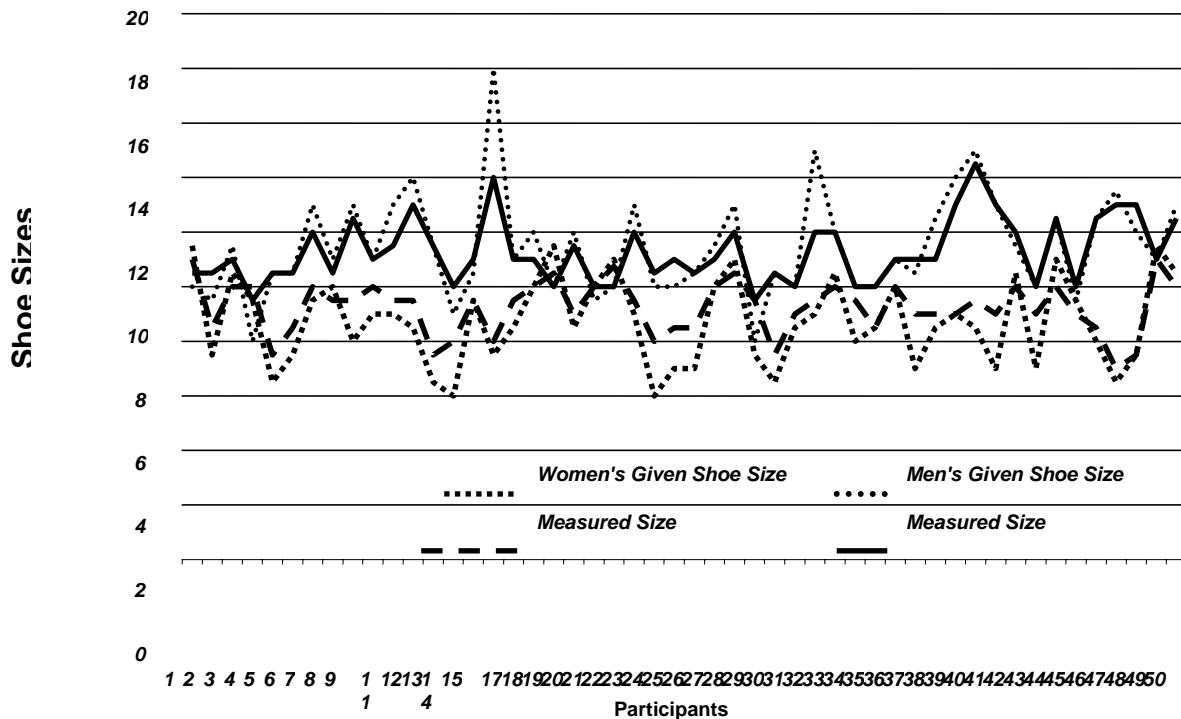


Figure 8. Comparison of Men & Women's Given & Measured Shoe Sizes. This line graph shows the actual shoe size versus the measured shoe size that each participant in my study wore. The shoe sizes were measured in inches and if the above lines matched each other perfectly then the participants in my study would have been wearing the correct shoe sizes. However, there is a larger discrepancy in the women's given and actual measured shoe size than in the men's.

Discussion

My hypothesis was accepted because the p value was less than 0.05 and the females participants in the study developed more corns and calluses than the men did. When doing this experiment, I expected to find that the females would have a greater occurrence of corns and calluses present on their feet than the male participants. I expected this to happen because of the sure fact that females wear improper shoe sizes. They also wear ill-fitting shoes that just look *cute* rather than for comfort. The anatomy of the women's foot is different from that of males. Also, the types of shoes that are made for women do not help support and comfort the foot as well as the different types of shoes for men did.

My results supported my expected hypothesis. Out of 100 participants, 50 female and 50 male, the females had a greater development of corns and calluses than the males (Figure 4). I did however get a lot of unexpected results. When I analyzed just corn development between the males and females, I found that the males had a slightly higher development of corns than the females did. I also found that in both the male and female participants, flat-footedness occurred more in the minorities than in Caucasians. I categorized that further and found that it was most common in African American males and females. It was also apparent that the female participants had a greater discrepancy than the males did in the shoe size they wrote down in the survey compared to the shoe size I measured (Figure 8).

Overall, I felt that I would have needed to do this study several more times with a lot more participants so that the trend of the females developing corns and calluses more than the males could be seen in a distinguishing pattern. I could have gotten better results by making my survey more

thorough and by asking more different types of questions such as the participants' race, the types of shoes they wore when they worked, and did they like to walk around barefooted. When I was giving my survey one of participants was very experienced in athletic training and they showed me a technique used by podiatrist which could of helped to determine if someone was flat-footed or high-arched. I found this out about halfway through my experiment so if I could have had enough time to back through all of my participants I could have done this test and gotten a more accurate finding on the high-arched of flat-footedness of my participants.

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