

Effects of High Heeled Gait on Knee Joint Mechanics

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ABSTRACT

Numerous women wear high heeled shoes, whether it be a professional attire, part of an outfit for a ballroom gala, or just casual day to day wear. Often, the high heel of choice in these situations is the stiletto. These shoes adversely affect natural gait and have the potential to alter joint mechanics in the knee during gait. **PURPOSE:** This study is designed to analyze the impacts of wearing high heels, and if it puts the user at a higher risk of a degenerative condition with repeated use. We hypothesized that all of our dependent variables would see a significant increase when wearing high heels. **METHODS:** For the scope of this project, we narrowed our analysis to the knee joint and ground reaction force loading rate. We designed this study using a Cortex motion capture system along with force plates to conduct a series of experiments. Six college aged women with experience walking in high heels and no injury or condition that would adversely affect normal gait were selected to participate in motion analysis experiments. There are 4 trials conducted in total, which include walking, and performing a lateral stepping motion to simulate dancing, each under barefoot and high heeled conditions. The variables we set out to analyze include knee compressive force, flexion moment, varus and valgus moments, ground loading rate, and EMG peak activity for muscles including medial and lateral gastrocnemius, vastus lateralis, and biceps femoris. All force data was normalized by body weight to compare across participants. **RESULTS:** After processing the data and performing a statistical analysis using a paired T-test with significance of $\alpha < 0.05$, we found the variables with a significant difference between barefoot and high heels is the knee compressive force during gait ($P = 0.001$) and loading rate from the ground reaction force ($P = 0.009$). **CONCLUSION:** This indicates that wearing high heels can significantly increase knee joint loading.