

Comparison of Sagittal Plane Knee Walking Kinematics When Wearing Over-The-Counter Support Devices

CHASE HINOJOSA, SETH A. BERG, & SCOTT P. McLEAN

Human Performance Laboratory; Department of Kinesiology; Southwestern University; Georgetown, TX

Category: Undergraduate

Advisor / Mentor: McLean, Scott (mcleans@southwestern.edu)

ABSTRACT

PURPOSE: To compare the effect of wearing a knee compression sleeve and a hinged knee brace on kinematics of the knee to not using a support device while walking in healthy college students.

METHODS: A convenience sample of 20 participants with no lower extremity surgical or injury history in the past 6 months was recruited for this study. All participants provided informed consent prior to beginning participation. A 12-camera motion analysis system was used to track the three-dimensional motion of sixteen passive reflective markers attached to the lower extremities of each subject according to the VICON Lower Extremity Plug-in Gait model. Each participant then completed one trial of overground walking at a self-selected speed for each of three knee support conditions (three trials total); no external knee support (NO), wearing a knee compression sleeve(CO), wearing an over-the-counter supportive knee brace with hinges (BR). Maximum and minimum knee angles in the sagittal plane were measured during the stance and swing phases. Range of motion (ROM) for each phase was computed as the difference between the maximum and minimum angles. Data were analyzed using one-way repeated measures ANOVA. **RESULTS:** Minimum sagittal plane knee angle during the stance phase, -0.2(3.8), 3.8(3.6), and -5.7(3.9) degrees for the NO, CO, and BR conditions respectively, significantly differed between support conditions ($F(2,30) = 54.21, p < 0.001$). Maximum sagittal plane knee angle in the stance phase, 9.2(8.7), 12.6(7.5), and 2.5(8.4) degrees for the NO, CO, and BR conditions respectively, significantly differed between support conditions ($F(2,30) = 42.596, p < 0.001$). Sagittal plane knee ROM during the stance phase, 9.4(6.2), 8.8(5.9), and 8.2(5.6) degrees for the NO, CO, BR conditions respectively, did not differ between conditions. Minimum sagittal plane knee angles during the swing phase, 29.9(5.6), 32.6(7.5), and 22.4(8.4) degrees for the NO, CO, and BR conditions respectively, significantly differed between support conditions ($F(2,30) = 15.946, p < 0.001$). Maximum sagittal plane knee angles during the swing phase, 56.4(6.5), 59.2(7.2), and 47.3(9.9) degrees for the NO, CO, and BR conditions respectively, significantly differed between support conditions ($F(2,30) = 62.9, p < 0.001$). Sagittal plane knee ROM during the swing phase, 26.5(7.3), 26.5(9.1), and 24.9(6.5) degrees for the NO, CO, BR conditions respectively, did not significantly differ in between conditions. **CONCLUSION:** For both the stance and swing phases, use of the compression sleeve maintained a more flexed knee than the no support condition. Conversely use of the hinged brace resulted in a more extended position than the no support condition during both the stance and swing phases. Performing gait with a more extended knee position may alter the ability of the knee to absorb shock. Therefore, medical professionals should be consulted before using an over-the-counter hinged knee brace.