SWACSM Abstract

Vertical Ground Reaction Forces During Stair Descent Transition for Individuals with Femoroacetabular Impingement and Osteoarthritis

SADIE E. PEETE, BRYCE TRUVER, MICHAEL BAHK, MARC MIRISCH, & MICHELE LEBLANC, FACSM

Biomechanics Laboratory; Exercise Science Department; California Lutheran University; Thousand Oaks, CA

Category: Undergraduate

Advisor/Mentor: LeBlanc, Michele (mleblanc@callutheran.edu)

ABSTRACT

Femoroacetabular impingement (FAI) is a pathological condition characterized by the misshapen junction between the femoral head and acetabular rim causing joint friction. Not all individuals with FAI experience symptoms associated with the condition. Previous research has determined differences between those with and without symptomatic FAI (FAI-s) and those with and without osteoarthritis (OA) during stair ascent (Hammond et al., 2017 and Hall et al., 2017, respectively). No studies focused on stair descent ground reaction forces (GRFs) between individuals with FAI and/or OA exist. **PURPOSE:** This study analyzed key vertical GRF values during stair descent transition in adults with FAI-s, asymptomatic FAI (FAI-a) and OA. **METHODS:** Individuals were recruited by an orthopedic surgeon who used radiographs to assign group membership (FAI-s n=10, FAI-a n=11, OA n=10). Each person descended a 3-step staircase onto a Kistler force plate embedded into the floor (1000 Hz). The stair to floor transition was analyzed for three trials for each foot contact. Peak vertical impact and active forces (Fz_1 and Fz_2, respectively) were normalized by BW and the three trial average was analyzed. Dependent and independent t-tests were used to compare transition feet and groups ($p < 0.05$). **RESULTS:** There were no differences for any group when comparing transition feet for Fz_1 or Fz_2 values. Additionally, there were no differences between the feet associated with the affected and unaffected hips for the FAI-s group. When comparing the larger and smaller Fz_1 values for each person, all groups had a significant difference ($p < 0.005$ for all). The FAI-s group had smaller Fz_1 values than FAI-a group for both the left and right foot transition (1.57 ± 0.34 BW vs. 1.81 ± 0.20 BW, p=0.035 and 1.62 ± 0.23 BW vs 1.81 ± 0.13 BW, p=0.019, respectively). There was a trend toward Fz_1 values being smaller for FAI-s when compared to OA for both foot transitions ($p < 0.08$). There were no differences between the FAI-a and OA groups for Fz_1 values and no differences between Fz_2 values between any of the groups for either transition foot. **CONCLUSION:** Individuals with symptomatic FAI transition from stairs to floor with smaller impact forces when compared to the other groups, perhaps to avoid painful hip conditions. All participants had asymmetrical impact transition forces.