

The Effects of Unilateral and Bilateral Battle Rope Exercise on the Lower Extremity Joint Force: A Pilot Study

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ABSTRACT

The battle rope exercise recently has increased its popularity due to cross fit gyms implementing it into the workout programs. Individuals use this workout to strengthen their upper body, however it is unknown how different modalities of using the battle ropes affects the lower extremity joint force required to stabilize the body. **PURPOSE:** To examine the effects of unilateral and bilateral battle ropes exercises on lower extremity joint force. **METHODS:** Subjects performed four bilateral battle rope trials and four unilateral battle rope trials. The trials consisted of twenty seconds of continuous activity with three minutes of rest in between during a single visit to the lab. Lower extremity joints were tracked using a Qualisys motion capture system and Bertec force platforms. Joint force data (normalized to body mass) and ground reaction force (reported in Newtons, both in the medial-lateral axis) were analyzed in the down phase of the movement (from peak rope height to the bottom of the motion). **RESULTS:** There was decreased lateral force in the hip joint during the bilateral exercise for the left hip (0.601BM) and the right hip (0.586BM) compared to the unilateral (0.803BM and 0.614BM, respectively). However, the knee and ankle showed decreased lateral force during the unilateral exercise (0.376BM and 0.200BM for the left and right knee, respectively and 0.829BM and 1.052BM for the left and right ankle respectively) compared to the bilateral exercise (0.569BM and 0.336BM for the left and right knee, respectively and 1.047BM and 1.145BM for the left and right ankle, respectively). The bilateral exercise showed increased medially-directed forces in the right limb (133.4N) and left limb (148.7N) -compared to the unilateral (109.3N and 110.1N, respectively). **CONCLUSION:** The results show a discrepancy in terms of medial-lateral joint force. The unilateral exercise shows increased lateral stress on the hip joints while the bilateral shows an increased lateral stress on the ankle and knee. During unilateral exercises, the non-active side (side without the moving arm) hip and knee show increased lateral forces while the active-side ankle shows increased lateral forces. Lower extremity joint position should be considered when using these activities due to their impact on joint force experienced in the lower extremities.