THE EFFECTS OF HIKING DOWNHILL USING TWO TREKKING POLES WHILE CARRYING DIFFERENT EXTERNAL LOADS IN A BACKPACK

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INTRODUCTION

Hiking is commonly known as a recreational activity shown to offer significant positive effects on the human body. However, often times this requires transportation of an external load for supplies, with the most common and advantageous method by use of a backpack. Also, many people are required to walk downhill with an external load as part of their occupation. Walking downhill and the addition of an external load has been shown to increase the risk of musculoskeletal pain and injury. (1).

To alleviate some of the loading placed on the lower extremities, walking poles have become popular. The effectiveness of poles in downhill walking without packs has been demonstrated in that the poles successfully reduced forces placed on the lower extremities (2,3). Furthermore, poles used in uphill backpacking were successful in reducing muscle activity (4). It was hypothesized that the use of hiking poles would help reduce the net joint moments and net joint power for the ankle, knee and hip during the stance phase across all load conditions.

METHODS

Fifteen male subjects (ages 20-49; height 1.36 m–1.68 m and weight: 600 N-1063N) were selected from hiking clubs in the Salem, Oregon area. All subjects were experienced hikers self-proclaimed to be comfortable with the use of hiking poles.

All participants were required to complete all conditions. Conditions included with and without the use of hiking poles for each of the three backpack conditions (no pack, day pack and large expedition pack). The day pack was loaded with 15% of body weight while the expedition pack was loaded with 30% of body weight. Ten trials were completed for each condition, for a total of 60 trials for each participant. All conditions were in random order for each participant.

An average of each of the six conditions was used for analysis. The net joint moments and power at the ankle, knee and hip, as well as the net joint forces at the knee were examined statistically using a 2 X 3 (poles X packs) repeated measures ANOVA, with a family-wise alpha level of 0.05, using a Bonferonni adjustment, to protect against the running of multiple tests.

RESULTS AND DISCUSSION

A significant reduction was observed for the dominant moment at each of the joints in the lower extremity (plantar flexion at the ankle, extension at the knee and hip) (See Figures 1). These results may be due to a reduction in the muscle activity which may help the muscle maintain the ability to help stabilize the joint, and, thus, reduce risk of injury.

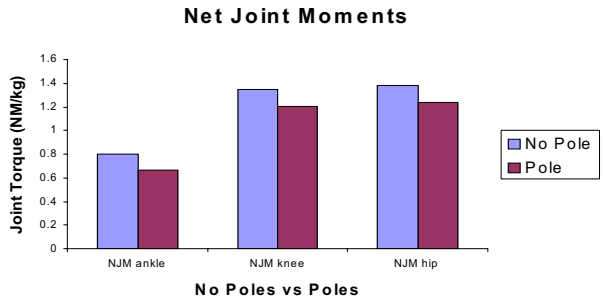

Figure 1: Changes in net joint moment for the ankle knee and hip with pole use

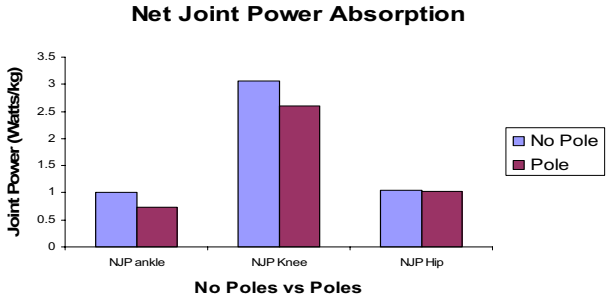

Figure 2: Changes in net joint power for the ankle knee and hip with pole use

Reductions were also observed in the peak power absorption (See Figure 2) for the ankle and knee. These reductions are believed to result in a lessening of eccentric muscle actions, which may reduce the post exercise pain felt by participants. These results held true across pack conditions, as packs seemed to only result in a larger power generation at the hip.

CONCLUSIONS

A reduction in the moments and power around the joint, with the use of poles, will help reduce the dangerous loading on the joints of the lower extremity. These reductions may lead to a larger portion of the population being able to enjoy a more active lifestyle.

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