

ORIGINAL RESEARCH

EFFECTS OF A BAND LOOP ON LOWER EXTREMITY MUSCLE ACTIVITY AND KINEMATICS DURING THE BARBELL SQUAT

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ABSTRACT

Background: Medial knee collapse can signal an underlying movement issue that, if uncorrected, can lead to a variety of knee injuries. Placing a band around the distal thigh may act as a proprioceptive aid to minimize medial collapse of the knee during squats; however, little is known about EMG and biomechanics in trained and untrained individuals during the squat with an elastic band added.

Hypothesis/Purpose: To investigate the effects of the TheraBand® Band Loop on kinematics and muscle activity of the lower extremity during a standard barbell back squat at different intensities in both trained and untrained individuals.

Study Design: Cross-sectional, repeated measures.

Methods: Sixteen healthy, male, university aged-participants were split into two groups of eight, consisting of a trained and untrained group. Participants performed both a 3-repetition maximum (3-RM) and a bodyweight load squat for repetitions to failure. Lower extremity kinematics and surface electromyography of four muscles were measured bilaterally over two sessions, an unaided squat and a band session (band loop placed around distal thighs). Medial knee collapse, measured as a knee width index, and maximum muscle activity were calculated.

Results: During the 3-RM, squat weight was unaffected by band loop intervention ($p=0.486$) and the trained group lifted more weight than the untrained group ($p<0.007$). The trained group had a greater squat depth for both squat conditions, regardless of the band ($p=0.0043$). Knee width index was not affected by the band during the eccentric phase of bodyweight squats in the trained (band: 0.76 ± 0.08 , no band: 0.73 ± 0.08) or untrained group (band: 0.77 ± 0.70 , no band: 0.75 ± 0.13) ($p=0.670$). During the concentric phase, knee width index was significantly lower for 3-RM squats, regardless of group.

Conclusion: Despite minimal changes in kinematics for the untrained group, increased muscle activity with the band loop may suggest that a training aid may, over time, lead to an increase in barbell squat strength by increasing activation of agonist muscles more than traditional, un-banded squats. Greater maximal muscle activity in most muscles during band loop sessions may provide enhanced knee stability via increased activation of stabilizing muscles.

Level of Evidence: 3

Key words: Elastic resistance, electromyography, knee valgus, kinematics, squat, TheraBand

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