

Biomechanical Loads during Common Rehabilitation Exercises in Obese Individuals

Researchers:

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Abstract

Squat and lunge are commonly prescribed rehabilitation exercises to improve performance during functional activities. Most studies focusing on biomechanics have examined younger, normal weight populations, but the influence of obesity and level of difficulty on lower extremity biomechanical loads has not been documented. It is unknown if clinicians should make different recommendations when prescribing these exercises for obese individuals

Ten obese females (mean age, 37.4 ± 3.7 years; BMI 39.2 ± 3.7 kg/m²) and ten normal weight, age-matched female controls (BMI < 23 kg/m²) volunteered for the study. Each group performed two trials: squatting with position held at three standardized knee angles and lunging with position held at three standardized distances. Three dimensional motion analysis using infrared markers and force plates was used to measure and calculate hip, knee, ankle and support moments and range of motion.

Ankle extensor moments were higher in obese subjects for squat 80° ($p=0.04$). Support moments were higher in obese subjects for squat 70° ($p=0.03$) and 80° ($p=0.01$). During lunge at all levels (1.0, 1.1, and 1.2), hip extensor moments were higher in obese subjects ($p=0.004$, 0.003, and 0.007 respectively). The results suggest that obese individuals may experience higher biomechanical stress than normal weight subjects while performing basic rehabilitation exercises. A non-linear relationship was found between hip moments and BMI during squat which makes the assessment of how best to approach exercise in the obese population even more challenging.

Objectives

Obese subjects are more likely than normal weight subjects to suffer from increased biomechanical stresses while performing exercise, and even daily activities, resulting in pain, discomfort, and an increased potential for injury. The purpose of this study was to analyze the lower extremity biomechanics in obese and normal weight females during squat and lunge exercises.

Goals

The goal of this study was to explore if clinicians should consider different recommendations when prescribing rehabilitation exercises for obese individuals. It was hypothesized that restricted joint mobility in obese females would be associated with increased hip and knee joint moments as compared to normal weight subjects.