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Referent Weight Bearing Parameters on an Elliptical Trainer

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Summary:

The investigation of average percentage weight-bearing values and weight-bearing distribution patterns during changing resistance and incline on an elliptical trainer.

Abstract:

Introduction

Sports physicians are frequently required to decide on patient weight-bearing limitations following certain bony or soft tissue injuries as well as lower-limb surgical procedures. Elliptical training is a common activity that the injured athlete will want to engage in as soon as possible following injury or surgery. In order for the physician to be able to advise regarding weight-bearing on this device, the average percentage weight-bearing (APBW) values during increasing resistance and incline must be known.

Objectives: To investigate the APBW values and weight-bearing distribution patterns (WBDP) during changing resistance and incline on an elliptical trainer.

Methods

An innovative weight-bearing system (SmartStep™) was utilized to measure the weight bearing values. Asymptomatic subjects (N=24; median age, 29y; range, 21-69y) were included. The protocol included three tests of changing resistances and inclines, measuring entire, hind, and fore foot values.

Results

In the paired resistance and incline test, the hind foot value remained unchanged at 30% APBW throughout the changing test parameters. The entire foot APBW value started from 70% (SD =15.3) when the resistance and incline levels were at one and one respectively and reached 81 (SD =19.4) when the resistance and incline levels were at 20 and 20 respectively. In the constant incline and increasing resistance test, the entire foot APBW value increased from 70 to 85 (SD = 15.8). The hind foot consistently exhibited the least amount of APBW.

Discussion

The results show that exercising on an elliptical device significantly reduces the APBW values, especially weight-bearing through the hind foot. The results may now assist medical personnel involved in decision making regarding early return to weight-bearing following lower limb trauma and surgical procedures. This may maintain and improve range of movement and prevent atrophy during the initial stages of the rehabilitation process.