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The Acute Effect of Pre-Exercise Static and Dynamic Stretching of the Leg Extensors

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QuickTime™ and a decompressor are needed to see this picture.

Abstract

The purpose of this study was to investigate the acute effects of pre-exercise static and dynamic stretching on peak torque of the knee extensors in female athletes and non-athletes. Thirty subjects (15 athletes and 15 non-athletes) completed three tests on an isokinetic dynamometer. After performing a randomly assigned pre-exercise stretching protocol (no stretching, static or dynamic) the subjects performed eight maximal, reciprocal knee extensions on an isokinetic dynamometer at three speeds (180, 120, 60°/s) while measuring peak torque. No significant differences ($p < .05$) were found among the three stretching protocols for either the athletes or non-athletes. However, the results suggest that static stretching may cause a loss in overall peak torque in contrast to dynamic stretching in athletes.

Introduction

Many athletes use some type of warm-up routine to prepare themselves for exercise or athletic competition. Traditionally, these warm-ups have included some form of stretching, which has become commonplace in a variety of sports. There are numerous techniques of stretching, including static, dynamic, ballistic and proprioceptive neuromuscular facilitation (Alter, 1997). Among these, static stretching is most commonly used because it has been reported to be safe and easy to perform (Hedrick, 2000).

However, previous studies have reported that stretching exercises may negatively affect performance, especially following warm-up and prior to exercise (Kokkonen, Nelson & Cornwell, 1998). More specifically, studies have observed stretching-induced decreases in power output in men and women (Cramer, Housh, Cobern, Back & Johnson, 2006) as a result of both static and dynamic stretching.

Purpose

To investigate the effect of pre-exercise static and dynamic stretching on isokinetic peak torque of the leg extensors in college age female athletes and non-athletes.

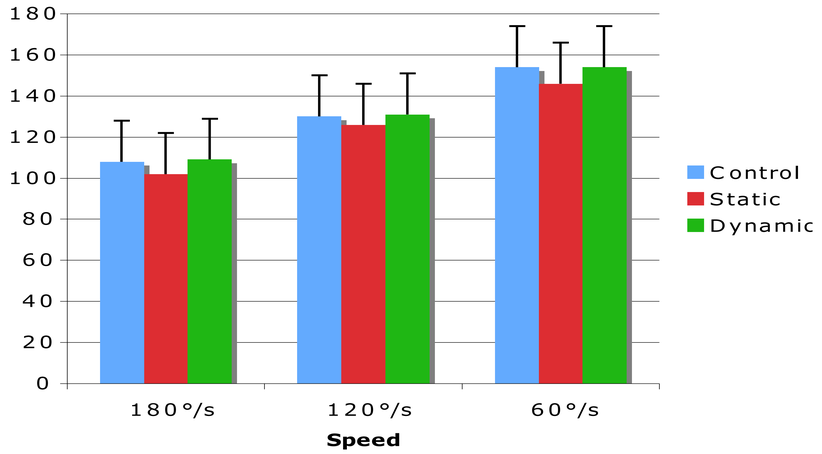

Figure 1. Average Peak Torque Values for Athletes

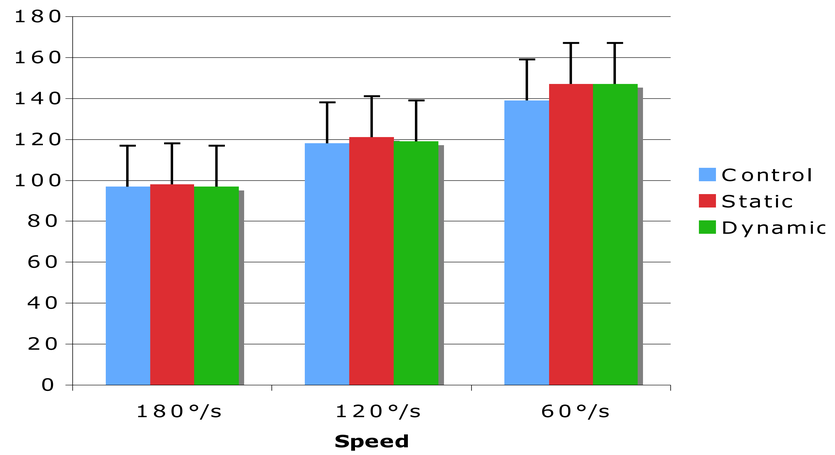

Figure 2. Average Peak Torque Values for Non-Athletes

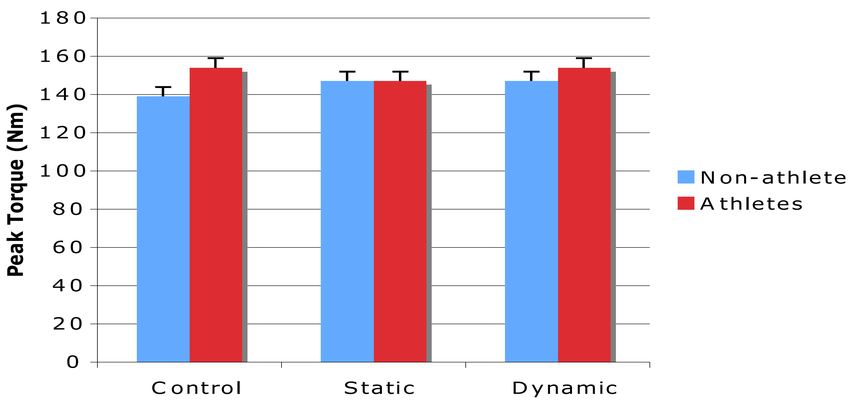

Figure 3. Average Peak Torque Values Compared Between Athletes and Non-Athletes at 60°/s.

Method

- 30 female subjects (15 athletes, 15 non-athletes)
- Five trials performed on nonconsecutive days
  - Two familiarization
  - Three experimental
- Three pre-exercise stretching protocols
  - Control (no stretching), static, dynamic
- A Cybex Isokinetic Dynamometer was used to measure peak torque (Nm)
- Eight maximal, reciprocal knee extensions performed through a 90-degree range of motion at three descending velocities:
  - 180°/s, 120°/s, 60°/s
- One minute rest between velocities
- A repeated measures ANOVA was used to analyze data with $p<.05$

Results and Discussion

There were no significant differences observed between the athletes and non-athletes among the three stretching protocols. However, athletes exhibited a slightly lower torque following static stretching (Figure 1) and the non-athletes showed increased torque following both types of stretching (Figure 2). Figure 3 shows that athletes produced a slightly higher torque at the different speeds, signifying that their level of power was greater than the non-athletes. Despite lack of significance, these findings suggest that static stretching prior to exercise may cause detrimental effects on torque production in athletes, but may not have the same effect in non-athletes.

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