Acute Static Stretching Does Not Affect Golgi Tendon Organ Reflex Inhibition

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Abstract

Context

Exercise-associated muscle cramps (EAMC) are the most common heat-related illness experienced by athletes. Static stretching is the most effective method of treating acute EAMC. Little evidence indicates it is effective at preventing EAMC.

It is unclear how static stretching alleviates EAMC; some scientists theorize stretching increases inhibition by activating golgi tendon organs (GTOs).

Research Questions

1. Does three, 1-minute bouts of static triceps surae stretching cause in increase in medial gastrocnemius GTO reflex inhibition?
2. If stretching increases medial gastrocnemius GTO inhibition, how long does this period of higher inhibition last post-stretching?

Hypotheses

1. Static stretching will increase medial gastrocnemius GTO inhibition immediately post-stretching.
2. GTO inhibition will return to baseline levels within 5 minutes post-stretching.

Methods

Experimental Design

Cross-sectional, laboratory study

Inclusion Criteria

 laundering

Independent Variables

- Time (pre-stretching, 1, 5, 10, 15, and 30 min post-stretching)
- Number of GTO measurements before, immediately after, and 1, 5, 10, 15, and 20 min post-stretching

Dependent Variables

- Inhibition area (mV*ms

- Inhibition maximum (mV)
- Inhibition duration (ms)

Procedure Timeline

- Procedure Time
  - 0 min
  - Post-Stretch Time (min)
- Procedures
  - Sign consent, Body weight, Determined leg dominance, Le supine, and with dominant leg, Attach EMG electrodes, Find proper position on tendon for stimulating electrodes, Perform 3

Results

- Inhibition data were normalized using background EMG activity
- An algorithm (MatLab) identified inhibitory points and calculated the most inclusion measures
- Main Outcome Measures
  - Inhibition area (mV*ms
  - Inhibition maximum (mV)
  - Inhibition duration (ms)

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- Inhibition duration (ms)

- Pre-stretching, 1, 5, 10, 15, and 30 min post-stretching

- Pre-stretching: 0.07 ± 0.09
  - 1 Min Post-Stretching: 0.07 ± 0.10
  - 5 Min Post-Stretching: 0.06 ± 0.08
  - 10 Min Post-Stretching: 0.05 ± 0.04
  - 15 Min Post-Stretching: 0.05 ± 0.04
  - 30 Min Post-Stretching: 0.05 ± 0.05

- Table 1: GTO Inhibition Area, Maximum, and Duration Pre and Post-Acute Static Stretching

Conclusions

- Pre-stretching data is the average of three GTO inhibition trials performed prior to the acute static stretching period. Data are Means ± SD (n = 12)

Clinical Significance

- Single bouts of static stretching are unlikely to prevent EAMC assuming the theory that static stretching increases inhibition is correct.
- Athletic trainers may wish to try several methods besides stretching to prevent EAMC occurrence.
- The effect of chronic stretching programs on GTO inhibition is unknown and warrants further examination.