

Journal of Athletic Training

Home For Journal For Authors For Reviewers For Readers For Subscribers For Students Help

Home > [Journal of Athletic Training](#) > [January/February 2008](#) > Muscle Stiffness and Spinal Stretch Reflex Sensitivity in the Triceps ...

[Advanced Search](#)

National Athletic Trainers' Association Links

- [NATA Home](#)
- [Online Manuscript Submission and Review](#)
- [Advertising](#)
- [Facts & Figures](#)
- [Editor-in-Chief](#)
- [Journal Editors](#)
- [Editorial Board](#)
- [NATA Position Statements](#)
- [PubMed Central](#)
- [Search PubMed](#)
- [Contact Us](#)

[◀ Previous Article](#) [Volume 43, Issue 1 \(January/February 2008\)](#) [Next Article ▶](#)

 [Add to Favorites](#)  [Share Article](#)  [Export Citations](#)

 [Track Citations](#)  [Permissions](#)

[Full-text](#)

[PDF](#)

Article Citation:

J. Troy Blackburn, Darin A. Padua, Kevin M. Guskiewicz (2008) Muscle Stiffness and Spinal Stretch Reflex Sensitivity in the Triceps Surae. *Journal of Athletic Training*: January/February 2008, Vol. 43, No. 1, pp. 29-36.

doi: 10.4085/1062-6050-43.1.29

Original Research

Muscle Stiffness and Spinal Stretch Reflex Sensitivity in the Triceps Surae

J. Troy Blackburn, PhD, ATC, Darin A. Padua, PhD, ATC, and Kevin M. Guskiewicz, PhD, ATC, FACSM

University of North Carolina at Chapel Hill, Chapel Hill, NC

Abstract

Context: Greater musculotendinous stiffness may enhance spinal stretch reflex sensitivity by improving mechanical coupling of the muscle spindle and the stretch stimulus. This heightened sensitivity would correspond with a shorter latency and higher-amplitude reflex response, potentially enhancing joint stability.

Objective: To compare spinal stretch reflex latency and amplitude across groups that differed in musculotendinous stiffness.

Design: Static group comparisons.

Setting: Research laboratory.

Patients or Other Participants: Forty physically active individuals (20 men, 20 women).

Intervention(s): We verified a sex difference in musculotendinous stiffness and compared spinal stretch reflex latency and amplitude in high-stiffness (men) and low-stiffness (women) groups. We also evaluated relationships between musculotendinous stiffness and spinal stretch reflex latency and amplitude, respectively.

Main Outcome Measure(s): Triceps surae musculotendinous stiffness and soleus spinal stretch reflex latency and amplitude were assessed at 30% of a maximal voluntary isometric plantar-flexion contraction.

Results: The high-stiffness group demonstrated significantly greater stiffness (137.41 ± 26.99 N/cm) than the low-stiffness group did (91.06 ± 20.10 N/cm). However, reflex latency (high stiffness = 50.11 ± 2.07 milliseconds, low stiffness = 48.26 ± 2.40 milliseconds) and amplitude (high stiffness = $0.28\% \pm 0.12\%$ maximum motor response, low stiffness = $0.31\% \pm 0.16\%$ maximum motor response) did not differ significantly across stiffness groups. Neither reflex latency ($r = .053$, $P = .746$) nor amplitude ($r = .073$, $P = .653$) was related significantly to

Volume 43, Issue 1
(January/February 2008)

[Next >](#)



[Current Issue](#)
[Available Issues](#)

Journal Information

Print ISSN 1062-6050

eISSN 1938-162X

Frequency Bimonthly:

January/February
March/April
May/June
July/August
September/October
November/December

Register for a Profile

Not Yet [Registered?](#)

Benefits of Registration Include:

- A Unique User Profile that will allow you to manage your current subscriptions (including online access)
- The ability to create favorites lists down to the article level
- The ability to customize email alerts to receive specific notifications about the topics you care most about and special offers

[Register Now!](#)

Related Articles

Articles Citing this Article

[Google Scholar](#)

Search for Other Articles By Author

- J. Troy Blackburn
- Darin A. Padua
- Kevin M. Guskiewicz

Search in:

musculotendinous stiffness.

Conclusions: A moderate level of pretension (eg, 30%) likely eliminates series elastic slack; thus, a greater change in force per unit-of-length change (ie, heightened stiffness) would have minimal effects on coupling of the muscle spindle and the stretch stimulus and, therefore, on spinal stretch reflex sensitivity. It appears unlikely that differences in musculotendinous stiffness influenced spinal stretch reflex sensitivity when initiated from a moderate level of pretension. Consequently, differences in musculotendinous stiffness did not appear to influence dynamic joint stability with respect to reflexive neuromuscular control.

Keywords: [latency](#), [amplitude](#), [material modulus](#), [compliance](#), [neuromuscular control](#)

J. Troy Blackburn, PhD, ATC, contributed to conception and design; acquisition and analysis and interpretation of the data; and drafting, critical revision, and final approval of the article. Darin A. Padua, PhD, ATC, and Kevin M. Guskiewicz, PhD, ATC, FACSM, contributed to conception and design; analysis and interpretation of the data; and drafting, critical revision, and final approval of the article.

Address correspondence to J. Troy Blackburn, PhD, ATC, 307 Woollen, CB #8605, The University of North Carolina at Chapel Hill, Chapel Hill, NC 27599-8605. Address e-mail to troyb@email.unc.edu

[top](#) ▲